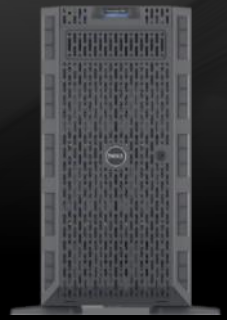
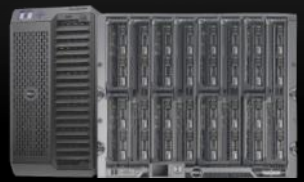

Tradicionalna
vs.
Moderna Infrastruktura
DELL EMC

SCALE AUTOMATE PROTECT

#1 INDUSTRY'S #1 Server Portfolio

PowerEdge





OpenManage® Enterprise – Intelligent Automation Systems Management

Towers | **Racks** | **Modular** | **Extreme Scale Infrastructure**

*Based on units sold (tie). IDC Worldwide Quarterly Server Tracker, Q1-Q3, 2016.

PowerEdge server solutions

ADAPT AND SCALE
to dynamic business needs

AUTOMATE
to sustain and grow

PROTECT your customers and your business

1 **Scalable Business Architecture**
Dynamic server portfolio optimized for all your workloads

2 **Intelligent Automation**
Automate routine management & free up skilled resources

3 **Integrated Security**
Fortify business operations and profitability

PowerEdge T640

Versatile and scalable powerhouse with massive internal storage capacity in a rack or tower form

Targeted Workloads

- Desktop and server virtualization, ERP, consolidation
- Databases, business intelligence, and analytics
- Applications and imaging for medical, education and science

Key Capabilities

- Address data growth with up to 32 x 2.5” or 18 x 3.5” drives
- Deliver faster insights with up to 8 NVMe drives
- Drive demanding workloads with up to 4 doublewide 300W GPU accelerator cards*
- Easy lifecycle manageability with integrated iDRAC

HIGHLIGHTS

- 10-fold increase in Ethernet speed to boost productivity (1GbE to 10GbE)*
- Easily rack in your data center or store under your desk as a tower

*GPU capability available in a rack form factor. Two 300W GPU are supported within NVMe drive configurations.

PowerEdge R940

Designed to handle extremely demanding, mission critical workloads and very large databases

Targeted Workloads

- In-memory database: massive resource footprint
- Analytics: NVMe and NVDIMM-N to maximize I/O
- Dense virtualization: dual-redundant hypervisors, Fault Resilient Memory

Key Capabilities

- Up to 12 NVMe and up to 24x2.5” universal backplane
- Performance optimized 2 socket configuration delivering 50% more QPI bandwidth than typical 2 socket server
- Internal M.2 boot optimized storage subsystem
- Advanced management and scripting support with integrated iDRAC9 and RESTful API

HIGHLIGHTS

- 50% more NVMe than R930
- Up to 48 DIMMs totaling 6TBs of memory with up to 12 NVDIMM-Ns
- Highly optimized design reducing footprint from 4U to 3U

Based on Dell EMC Internal Analyses 03/01/2017.

PowerEdge R740

Workhorse providing storage, I/O, and application acceleration balance with configuration flexibility

Targeted Workloads

- VDI: GPU and storage flexibility
- AI/Machine learning: Maximum accelerator card support
- Private cloud: Optimized performance

Key Capabilities

- Up to three 300W or six 150W accelerator cards maximizing workload acceleration
- Up to 16 x 2.5” or 8 x 3.5” drives
- Multi-vector cooling delivers correct air flow to each PCIe slot
- Up to 8 PCIe slots (one slot for PERC adapter)

HIGHLIGHTS

- Multi Vector Cooling design enables tremendous configuration flexibility and industry leading energy efficiency
- 50% more accelerator card support than R730
- 24 DIMMS with up to 12 NVDIMM-Ns
- Internal M.2 boot optimized storage subsystem

Based on Dell EMC Internal Analyses 03/01/2017.

PowerEdge R740xd

Ideal for applications requiring best-in-class storage performance, high scalability, and density

Targeted Workloads

- Software Defined Storage: ScaleIO, vSAN, XC (Nutanix)
- Big Data, Unstructured data, Analytics
- Service providers: data tier

Key Capabilities

- Up to 24 NVMe
- Up to 32 x 2.5” or 18 x 3.5” drives
- Supports up to three 300W or six 150W accelerator cards in non-NVMe configuration only
- Multi-vector cooling delivers correct air flow to each PCIe slot

HIGHLIGHTS

- Multi Vector Cooling design enables tremendous configuration flexibility and industry leading energy efficiency
- 6X more NVMe support than R730xd
- 24 DIMMs with up to 12 NVDIMM-Ns
- Internal M.2 boot optimized storage subsystem

Based on Dell EMC Internal Analyses 03/01/2017.

PowerEdge R640

Ideal combination for dense scale out data center computing and storage in a 1U/2S platform

Targeted Workloads

- HPC: Dell EMC Validated Solutions for HPC
- Virtualization: dense, powerful compute node
- Software Defined Storage: ScaleIO, vSAN, XC (Nutanix)
- Service Providers: application tier

Key Capabilities

- Mix drive types in front and rear with up to 12 x 2.5” drives, 4 x 3.5” drives, or 8 NVMe to optimize performance
- Internal M.2 boot optimized storage
- Advanced management and scripting support with integrated iDRAC9 and RESTful API

HIGHLIGHTS

- 200% more NVMe than R630
- Dell EMC Ready Nodes for ScaleIO, vSAN and XC (Nutanix)
- 27% increase in core count and 50% increase in memory bandwidth versus R630

Based on Dell EMC Internal Analyses 03/01/2017.

MX7000

*still not available in our region

DELL EMC

PowerEdge MX architecture

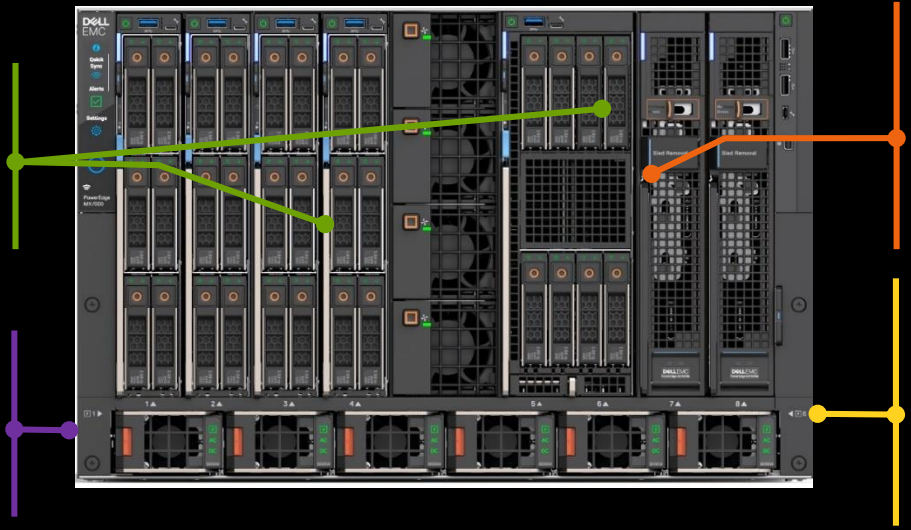
Kinetic infrastructure that embeds cloud-like velocity and serviceability with the speed, reliability and security of on-premises modular systems

Compute

No compromise design with up to eight 2-socket or four 4-socket options; up to eight drives, plus M.2 boot option, for greater storage options

Scalable Networking (rear)

Two redundant general purpose fabrics; MX Scalable Fabric Architecture for multi-chassis networking; Open Networking supports third-party OSes



Storage

Flexible, granular drive-level assignment; drives can be mapped to server or shared; up to 16 SAS HDDs/SSDs; 12Gb/s direct-attached SAS

Storage Networking (rear)

Redundant, highly available Fibre Channel or SAS storage fabric for high availability; SAS extension for optimal storage scalability

Chassis –7U 32-inch deep enclosure sharing power, cooling and OpenManage Enterprise – Modular Edition unified management

PowerEdge MX7000 chassis

Modular foundation to scale across multiple racks to suit a range of demanding use cases

Hosts flexible blocks of server and storage resources while providing outstanding efficiencies through shared power, cooling, networking, I/O and management within the chassis itself

Key Capabilities

- 7U modular enclosure has 8 front-accessible, single-width bays that accommodates variety of compute and storage sleds
- Support for 3 I/O fabrics, each with redundant modules
- QuickSync2 (wireless), Touchscreen LCD and traditional crash cart at-the-box management options

HIGHLIGHTS

- Support for at least three server processor microarchitecture generations and ready for 400Gb Ethernet and beyond
- Non-disruptive upgrades; unique no mid-plane design makes for easier future technology upgrades

PowerEdge MX740c compute

High performance with density for exceptional scalability

Targeted Use Cases

- Dense virtualization, foundation for collaborative workloads
- Foundation for software-defined storage and networking, hyper-converged infrastructure

Key Capabilities

- Up to two 28-core Intel® Xeon® Scalable processors
- 24 DDR4 DIMM slots, supports RDIMM / LRDIMM, up to 2666MT/s speeds
- High performance storage options include up to six 2.5” SAS/ SATA (HDD/SDD) or NVMe SSD drives plus optional M.2 boot
- Dual SD cards for fail safe virtualization is optional

HIGHLIGHTS

- Full featured, no compromise compute
- Offering exceptional performance and a rich set of storage options
- Supports several different server node configurations to meet unique requirements

PowerEdge MX840c compute

Powerful scale-up server for exceptionally demanding use cases

Targeted Use Cases

- Database-driven, mission-critical applications
- Big data analytics and performance workloads

Key Capabilities

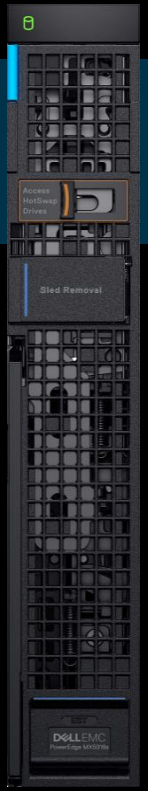
- Up to four 28-core Intel® Xeon® Scalable processors
- 48 DDR4 DIMM slots, supports RDIMM / LRDIMM, up to 2666MT/s speeds
- High performing storage options include up to eight 2.5” SAS/SATA (HDD/SDD) or NVMe SSD drives plus optional M.2 boot
- Dual SD cards for fail safe virtualization is optional

HIGHLIGHTS

- Full featured, no compromise compute
- Offering exceptional performance and a rich set of storage options
- Supports several different server node configurations to meet unique requirements

PowerEdge MX5016s storage

Dense, highly flexible, scale-out MX-Series storage sled



Targeted Use Cases

- Software defined storage: perfect for SDS solutions like vSAN
- Databases: such as SQL and ERP that have high storage demands
- Virtualization: dense footprint with flexibility

Key Capabilities

- Single-width,12Gbps, direct-attached SAS storage
- Up to sixteen 2.5” hot-pluggable drives and redundant hot serviceable expanders to ensure availability
- Drives can be individually mapped to one or more servers
- PERC and HBA storage controller options to best suit your workloads

HIGHLIGHTS

- Up to 7 storage sleds totaling 112 drives per MX7000 chassis (one compute sled is required per chassis that offers up to 6 internal drives)
- Avoid complex storage administration with end-to-end lifecycle management for all devices from a single interface

PowerEdge MX Ethernet and Fibre Channel I/O Modules

Cost-effective, high-performance scalable networking provide 25GbE and 32G FC host connectivity with 100GbE and 32G FC uplinks

Purpose-built for

- Data center infrastructure with integrated server, storage, networking and unified management

Key Capabilities

- **MX5108n Ethernet Switch** – 8 x 25GbE server facing ports, 2 x 100GbE ports, 1 x 40GbE port, and 4 x 10GBase-T ports
- **MX9116n Fabric Switching Engine** – 16 x 25GbE server facing ports, 2 x 100GbE/8 x 32G FC unified ports, 2 x 100GbE ports, and 12 Fabric Expansion ports
- **MX7116n Fabric Expander Module** – 16 x 25GbE server facing ports and 2 Fabric Expansion ports
- **MXG610s Fibre Channel Switch** – 16 x 32G FC internal ports, 8 x 32G FC SFP+ ports, and 2 QSFP 4 x 32G FC uplink ports

HIGHLIGHTS

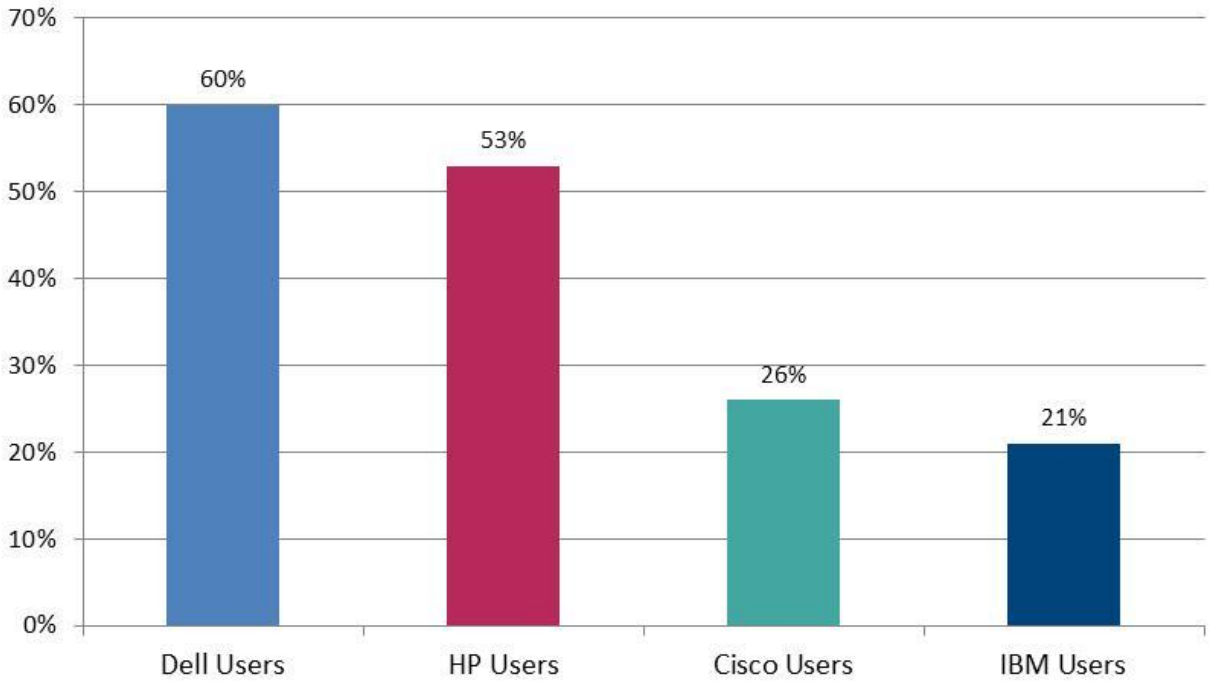
- MX Scalable Fabric Architecture provides low latency 25GbE connectivity across multiple chassis, managed from one pane of glass
- Embedded ToR supports rack and modular servers and capable of connection directly to fabric spine
- Comprehensive integrated management
- Open Networking running OS10EE and future-ready for other OSes

Competitive update

Damir Čulig
Enterprise Business Manager, Adriatics

Server lifecycle

- **It's about more than buying the server, its about the lifecycle of the server**
  - How many customers use servers 4-to-6 years or more*?



Intelligent automation technology

Agent-free embedded server management

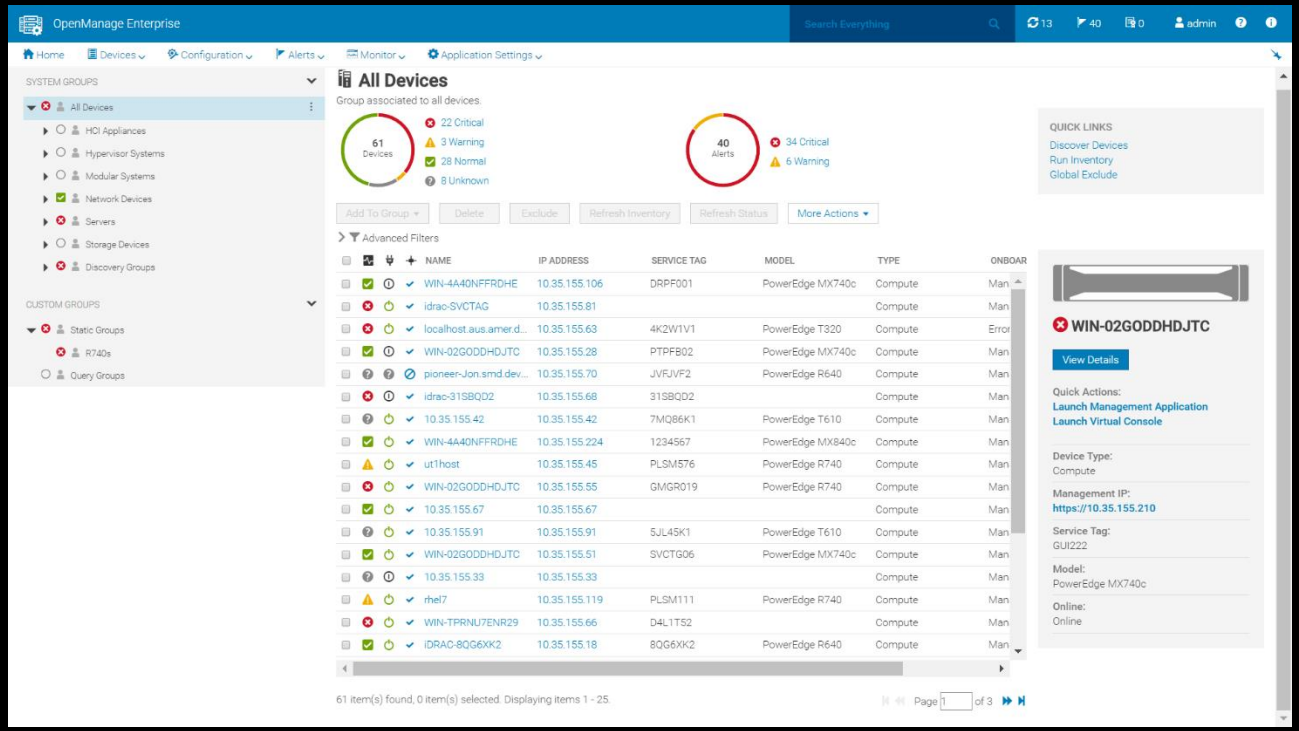
Standards-based systems management solutions

OpenManage®

Standards-based systems management solutions

- Industry's first truly agent-free server lifecycle management solution leveraging **iDRAC with Lifecycle Controller**
- Automates server lifecycle management tasks: **deploy, update, monitor, and maintain**
- Integral to the OpenManage portfolio and integration with 3rd party management consoles

Device management and health monitoring



- View and manage devices in a filterable grid
- Manage with device groups and queries
- Review the health status of each discovered device
- Allow notifications based on health status changes
- Perform management actions on one or more servers with minimal mouse clicks

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Cyber Resilient Architecture – Integrated security

Protect	Secure from Factory to OS boot
Detect	Detect drifts, identify breaches quickly
Recover	Fix corrupted or damaged BIOS, return to a trusted base rapidly
Retire	Erase storage securely, remove sensitive data instantly

Server Security Overview: Competitive Feature Landscape

Feature	Dell EMC PowerEdge 14G	HPE ProLiant Gen10	Huawei FusionServer V5	Lenovo ThinkSystem	Cisco UCS M5	Supermicro SuperServer X11
Silicon Root of Trust						
Digitally signed firmware updates						
Real time firmware security scanning						
FIPs/Common Criteria Compliance						
TAA Compliance						
System Lockdown						
UEFI secure boot with custom certificates						
Rapid OS Recovery						
Automatic BIOS recovery						
System Drift Detection						
Dynamically enabled USB ports						
Key Management						
TPM 1.0/2.0						
System Erase (instant secure erase) including NVMe drives						
Chassis Intrusion						
Secure access via front port (iDRAC Direct)						
Locking bezel						

Dell EMC Midrange & Entry Solutions

#1

INDUSTRY'S #1

Midrange & Entry Portfolio

UNITY

SC SERIES

POWERVAULT

DELL EMC

Midrange & Entry positioning

UNITY

INLINE EFFICIENCY
COMPRESSION ▪ ZERO DETECT ▪ DEDUPE

FLEXIBLE
UNIFIED ▪ ONLINE UPGRADES ▪ SW OR APPLIANCE

HYBRID CLOUD INTEGRATED
ARCHIVE BLOCK SNAPS / FILES TO CLOUD

SC SERIES

INTELLIGENT EFFICIENCY
POST-PROCESS DEDUPE AND COMPRESSION

FEDERATED
LIVE MIGRATE▪ LIVE VOLUME ▪ VOLUME ADVISOR

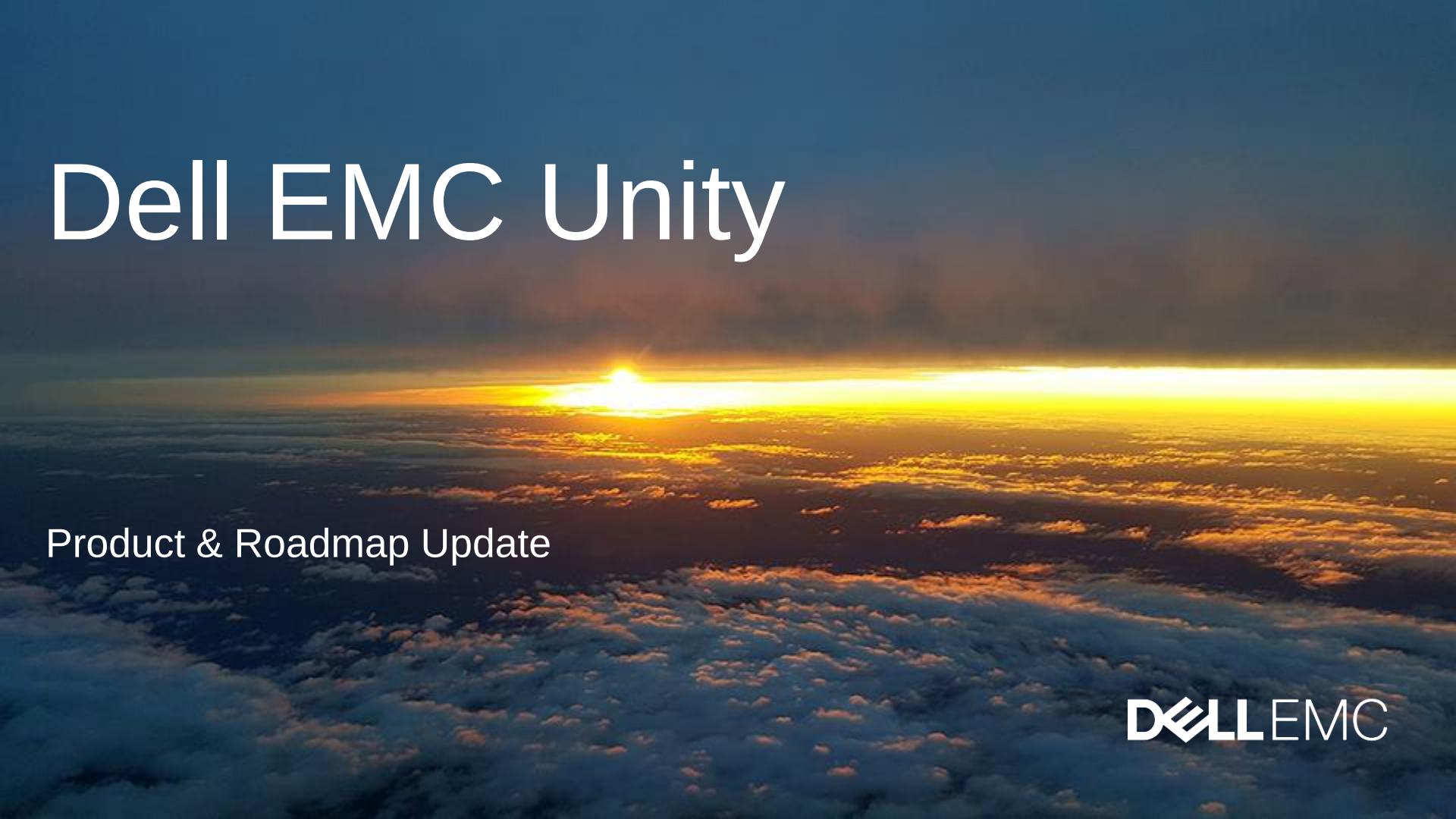
BEST ECONOMICS
LOWEST $ / GB + $ / IOPS ▪ PERSISTENT LICENSE

POWERVAULT

ENTRY PLATFORM
STARTS < $5K ▪ RAID AND SNAPS ▪ PERFORMANCE

HIGH BANDWIDTH AT LOW COST
IDEAL FOR HPC WORKLOADS ▪ LOW COST + DENSITY

DELL EMC


Dell EMC Unity
Product & Roadmap Update
DELL EMC

Dell EMC Unity All-Flash & Hybrid family

4 | 10 | 25 | 50TB
Server drives

2.4PB
150 drives

4PB
250 drives

8PB
500 drives

16PB
1000 drives

ONLINE DATA-IN PLACE UPGRADE*

Unity VSA
Single or Dual-Node HA

Unity 350F
Unity 300

Unity 450F
Unity 400

Unity 550F
Unity 500

Unity 650F
Unity 600

All-Flash (X50F)	**Server based**	**96GB, 6c/1.7GHz**	**128GB, 10c/2.2GHz**	**256GB,14c/2.0GHz**	**512GB, 14c/2.4GHz**
Hybrid (X00)		**48GB, 6c/1.6GHz**	**96GB, 8c/2.4GHz**	**128GB,10c/2.6GHz**	**256GB, 13c/2.5GHz**
Protocols	iSCSI, NFS, SMB	FC, iSCSI, NFS, SMB			
Replication	Snapshot Mobility / Archive, Synchronous & Asynchronous Replication				
Security & DR	Async. Replication	Sync Replication, RecoverPoint, D@RE (internal & external key manager)			
Cloud integration	Block snapshot and file archive to public/private cloud (Virtustream, AWS, Azure, ECS, IBM)				
Management	HTML5 Unisphere, CloudIQ, Rest API, Openstack, QoS, Vvols				
Architecture	Software defined	Active/Active, Dynamic pool**, Multi-core optimized (MCX), Persistent write cache			

*Online upgrades not possible from HFA to AFA or vice versa

** Available only on AFA

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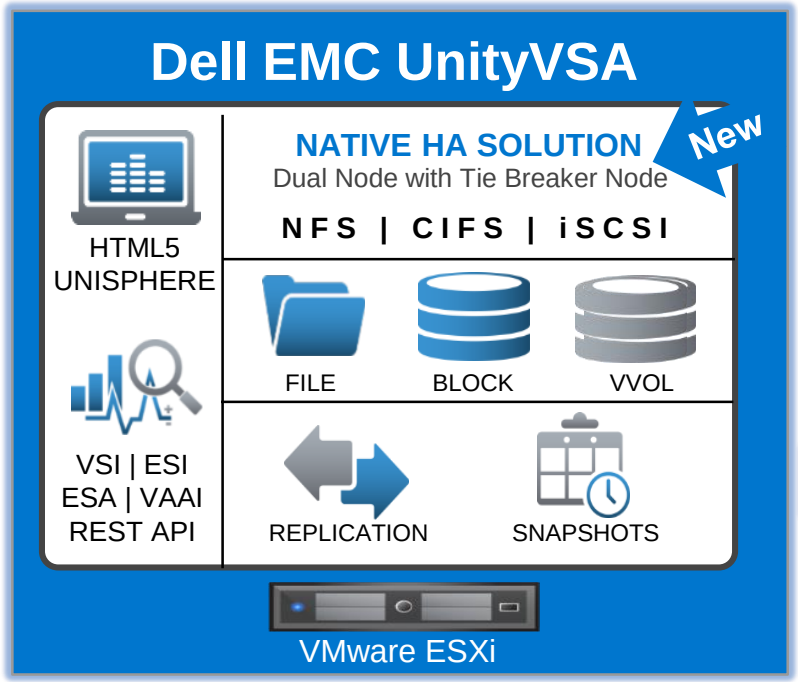
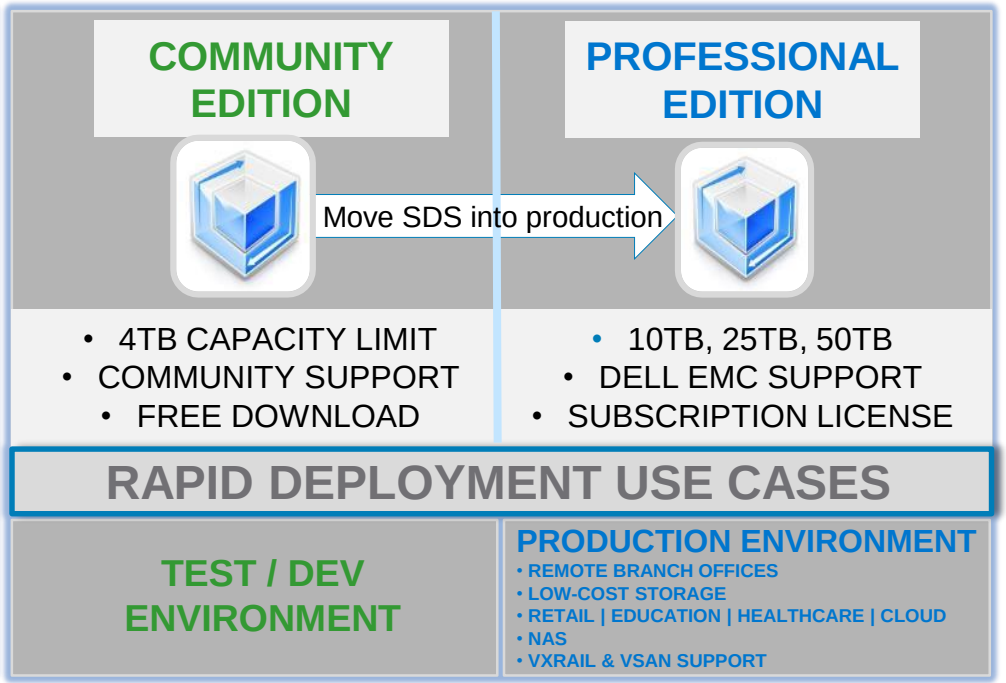
Dell EMC UnityVSA with native HA

New in OE 4.5





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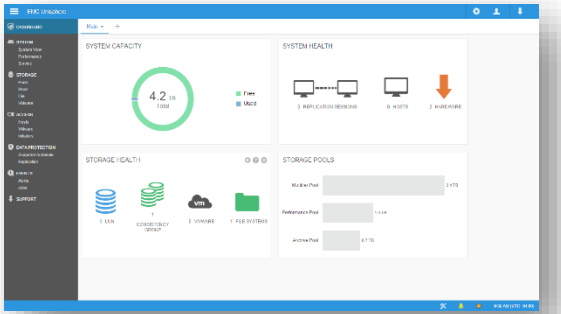
Simple to install, manage, and monitor



HTML-5 BASED UNISPHERE

- ✓ Compatible with modern browsers
- ✓ Easy navigation, simple workflows
- ✓ Modern look and feel
- ✓ Unified mgmt. paradigm

CloudIQ

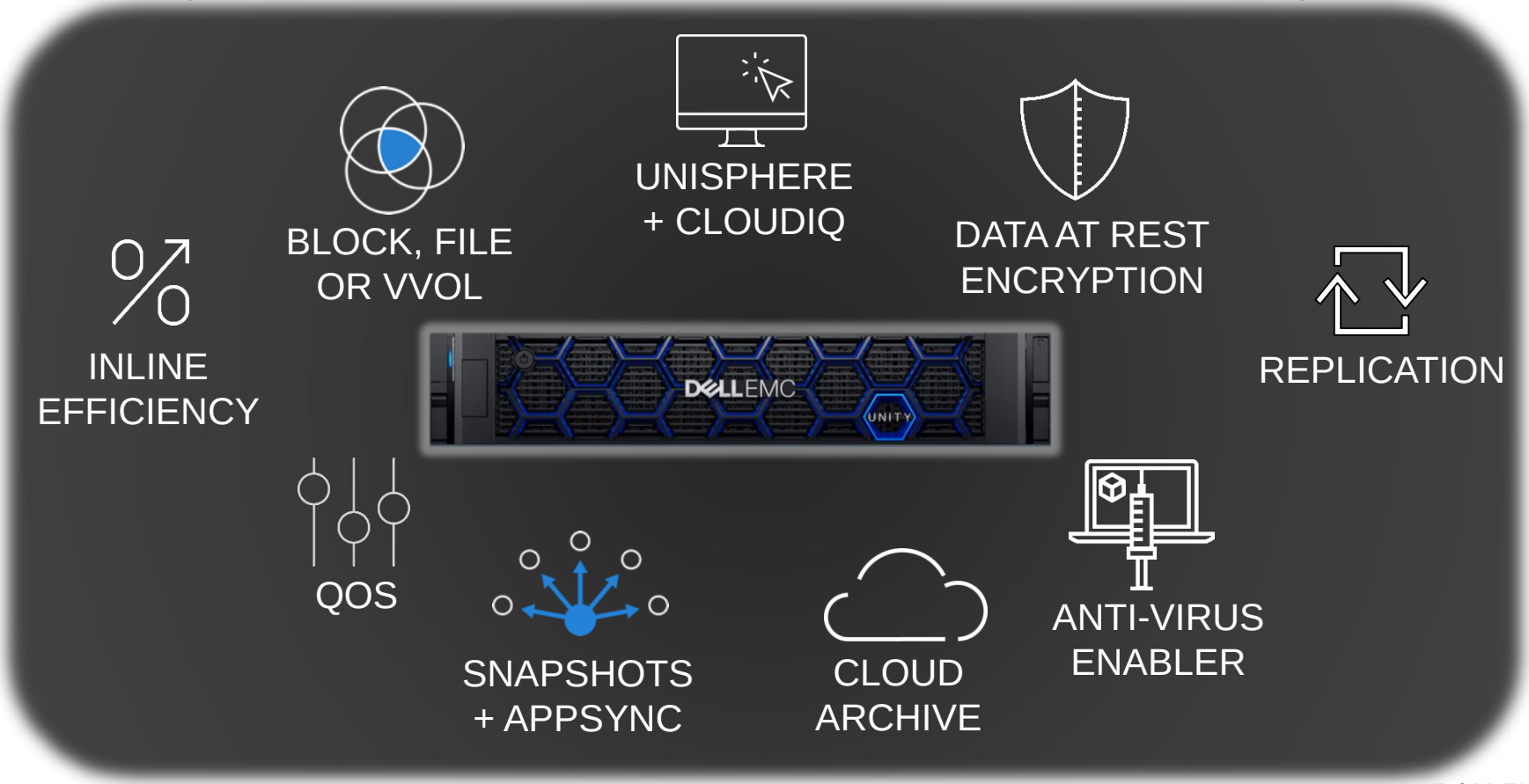
- ✓ Monitoring, alerting, and reporting
- ✓ Pro-active analysis and support
- ✓ Support planning and optimization

UNIFIED CLI AND REST API

- ✓ Easier app integration
- ✓ Simple HTTP commands
- ✓ API access from CLI, browser, app, and script

DELL EMC

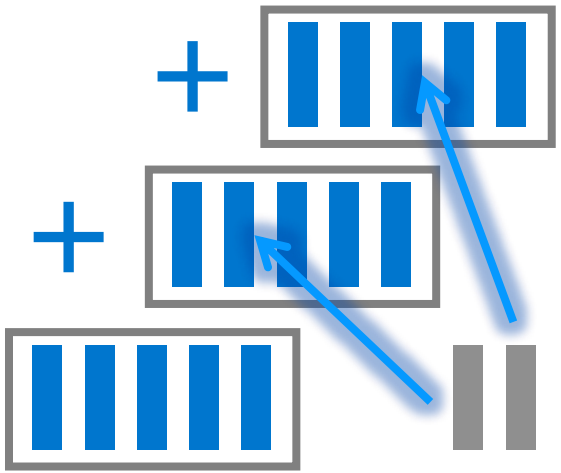
All array software included…all the time, every time



Dynamic Pools for all-flash arrays

Maximize performance & efficiency

TRADITIONAL POOL



Flash drives

RAID Widths & Spares

DYNAMIC POOL

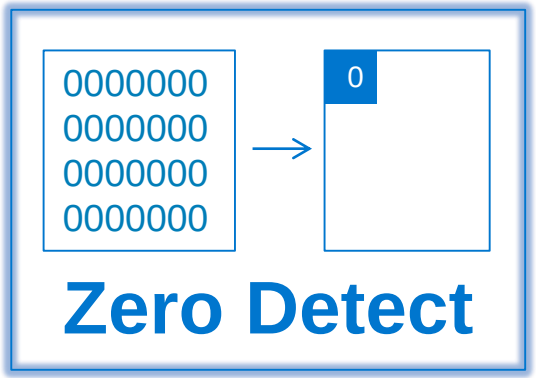
Flash drives – as needed

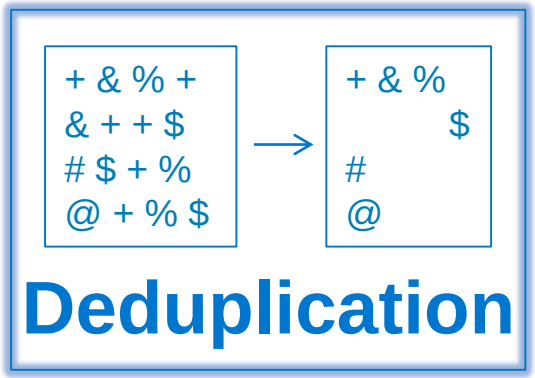
ADD SINGLE DRIVE TO POOL	HIGHER SPACE UTILIZATION
FASTER REBUILD TIME	SIMPLER AND LOWER TCO

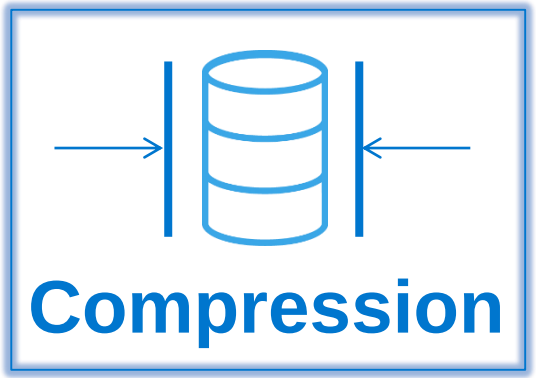
Distributed sparing and flexible pool size

Dell EMC Unity inline data reduction

Full end-to-end data efficiency capabilities

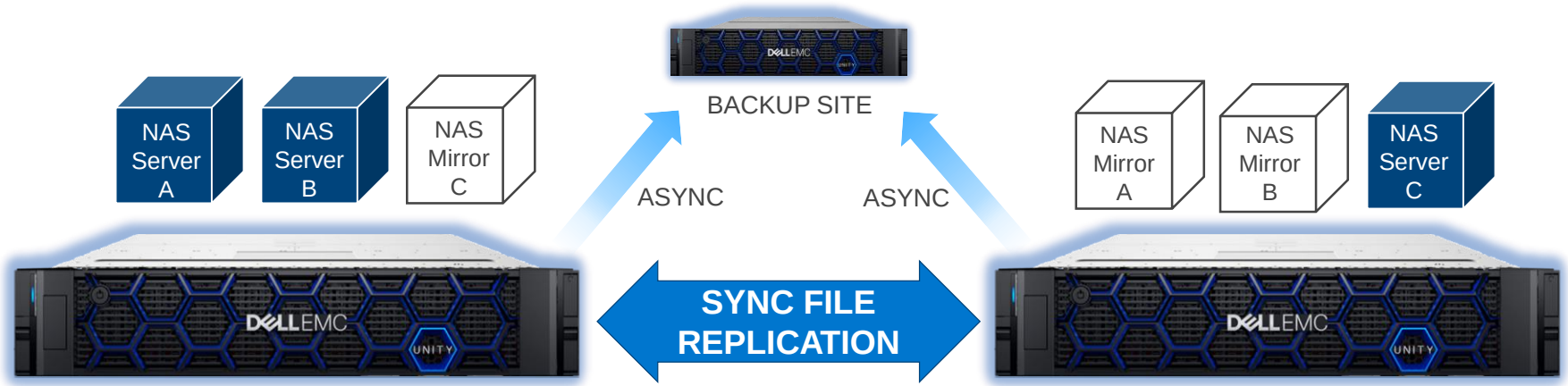






- Up to 3X overall data reduction savings with increased efficiency
- Dynamically deduplicates considering all data patterns
- Unified data reduction applicable to file and block data
- Reduce the amount of physical storage needed to store incoming data
- Data reduction in memory before being written to flash
- Flexible on/off settings per LUN, file system, and data store
- Easily manage data reduction via Unisphere, Unisphere CLI, or REST API
- Supported on Dell EMC Unity All-Flash arrays and Hybrid array all-flash pools

MetroSync file replication



- Sync file replication at NAS server granularity within metro distance
- Mirrors file systems, snaps and schedules
- Optional MetroSync Manager software to manage and automate failover

New in OE 4.5

BENEFITS

- ✓ Transparent failover of applications
- ✓ No data loss in event of DR
- ✓ Restore from 3rd site if both sites in metro area impacted

File-level retention

Meet compliance requirements with file data retention policies

New in OE 4.5

- **FLR-E:** Protecting data from changes made through CIFS, NFS, FTP
- **FLR-C:** Same as FLR-E plus meets SEC rule 17a-4(f)

- Protects files from modification or deletion until a specified retention date
- Creates permanent, unalterable set of files & directories to ensure data integrity
- Safeguards data by ensuring accessibility
- Simplifies the task of archiving data for administrators
- Improves storage management flexibility
- Native file migration from VNX

SC Series

Dell EMC SC Series Success Since FY Q217

CAPACITY

RAW	4,400 PB+
FLASH	750 PB+

REVENUE

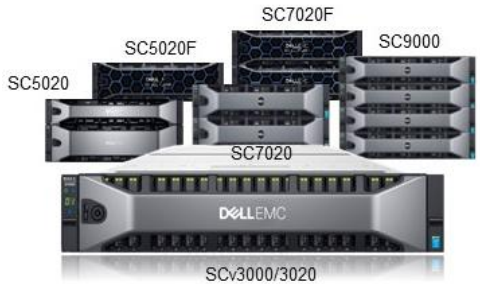
TOTAL	$2.10 B+
%FLASH	34%

SYSTEMS

TOTAL	41,600+
AFA	7,600+

CUSTOMERS*

TOTAL	24,000+



*Customer info based on GBL_PARNT_ACCT_NM
Not the same as D&B Global Parent Name

May'16 through February'19

SC Series Family

1PB
222 drives

SCv**3000/3020**

2.1PB
222 drives

SC**5020**

4PB
606 drives

SC**7020**

6PB
1024 drives

SC**9000**

SC All-Flash

2.1PB
222 drives

SC**5020F**

4PB
606 drives

SC**7020F**

Memory/Proc.	32GB 6c/1.7GHz	128GB 8c/2.4GHz	256GB 2x 8c/2.5GHz	512GB 2x 8c/3.2GHz	128GB 8c/2.4GHz	256GB 2x 8c/2.5GHz
Media	Hybrid (0-100% Flash)				All-Flash	
Protocols	FC, iSCSI, SAS		FC, iSCSI	FC, iSCSI, FCoE	FC, iSCSI	
Data reduction	Compression	Compression + Deduplication				
Multi-array	Federation (Live Migrate), Snapshot Mobility, Volume Advisor, Replication					
Business continuity	Sync Replication, Auto-Failover (Live Volume), Metro DR, RecoverPoint for VM, D@RE[2]					
Management	HTML 5 Unisphere for SC, CloudIQ, Dell Storage Manager, Openstack, QoS, Vvols					
Architecture	Dynamic RAID Tiering, Always Thin, Virtualized Page Pool, Distributed Sparing					

Max raw capacities assume 7.3 firmware and 2MB page size. 4MB and 512K page size options also available. For maximum flash performance, 512K
mmended. Discuss performance and expansion capacity needs with your Dell EMC representative or Authorized Partner.

2 – External key manager

DELL EMC

SC All-Flash: All Software Included … Every Time

Federated Management

Dedupe & Compression

Snaps and Replication

Data At Rest Encryption

Live Migrate + Volume Advisor

Quality of Service

Live Volume Auto Failover

CloudIQ Analytics

Application Protection

Welcome to SCOS 7.3

FREE software update provides quantum leap forward in

Performance

Huge IOPS boost across all platforms

Increased max capacity
- SC9000 now 6PB (2X)
- SC7020/F now 4 PB

10X faster networks
- 100Gb/25Gb iSCSI[1]

Simplicity

Web UI (HTML 5)

Now manage anywhere!

CloudIQ support

Easier upgrades and expansion
- SC4020 DIP upgrades
- SCv2000 federation/ replication with other SC

Efficiency

Distributed Sparing

HA enhancements
- Live Volume ALUA: lower latency, less network traffic
- Up to 500 Live Volumes

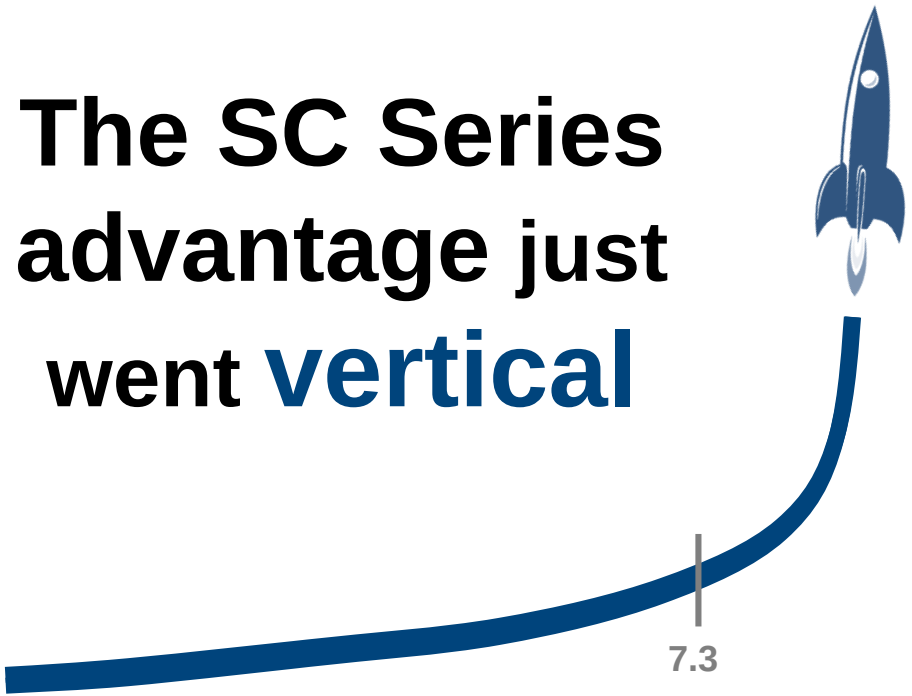
Lowest $/GB for Flash and Hybrid Flash

Increase value of every SC All-Flash and Hybrid model: SC9, 8, 7, 5, 4, v3, v2

DELL EMC

Largest performance increase in the history of SC

The SC Series advantage just went vertical



Efficiency

Simplicity

Performance

SC Flash Architecture

DELL EMC

How much of a boost are we talking?

100% reads
("Max IOPS")

Mixed workloads
("Real world" best)

	SCv3000	SC5020/F	SC7020/F	SC9000
Max IOPS[1]	665,000	1,025,000	1,200,000	2,220,000
Max IOPS with latency <1ms[1]	540,000	818,000	1,050,000	2,085,000
80/20 IOPS[2]	231,000	330,000	346,000	502,000
Max read throughput (MB/s)[3]	>19,000	>19,000	>29,000	>33,000
Max write throughput (MB/s)[4]	>9,500	>9,500	>14,000	>19,000

Hero numbers

3 platforms now
> 1 million
max IOPS

2X increase in max IOPS across every current platform

Improvement vs. 7.2

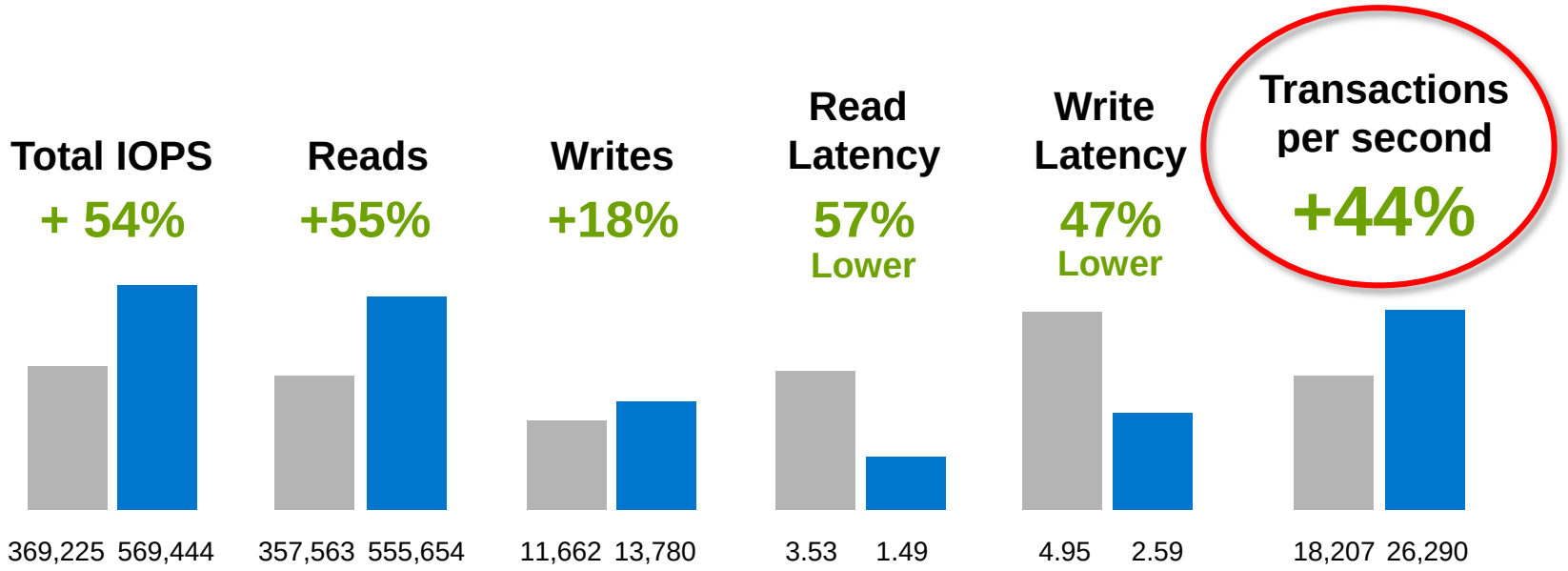
50,000 – 100,000 more mixed-workload IOPS across every current platform

1 – Based on internal tests performed in February, 2018 on all-flash configurations. 100% sequential reads with 4K sector transfer size. Actual performance will vary based on configuration, usage and manufacturing variability.
2 – Based on internal tests preformed in February 2018 on all-flash configurations running OLTP type workloads with 80% reads, 20% writes and 4k sector transfer size. Actual performance will vary based on configuration, usage and manufacturing variability.
3 – Based on internal tests in February 2018 on all-flash configurations running 100% sequential reads. Tests covered 16Kb-2048Kb sector transfer sizes for SC9000, and 256Kb-2048Kb sizes for SCv3000, SC5020 and SC7020. Actual performance will vary based on model, configuration, usage and manufacturing variability.
4 – Based on internal tests in February 2018 on all-flash configurations running 100% sequential writes. Tests covered 64Kb-2048Kb sector transfer size for SC9000 and SC5020, 128Kb-2048Kb for SC7020, and 256Kb-2048Kb for SC7020. Actual performance will vary based on model, configuration, usage and manufacturing variability.

DELL EMC

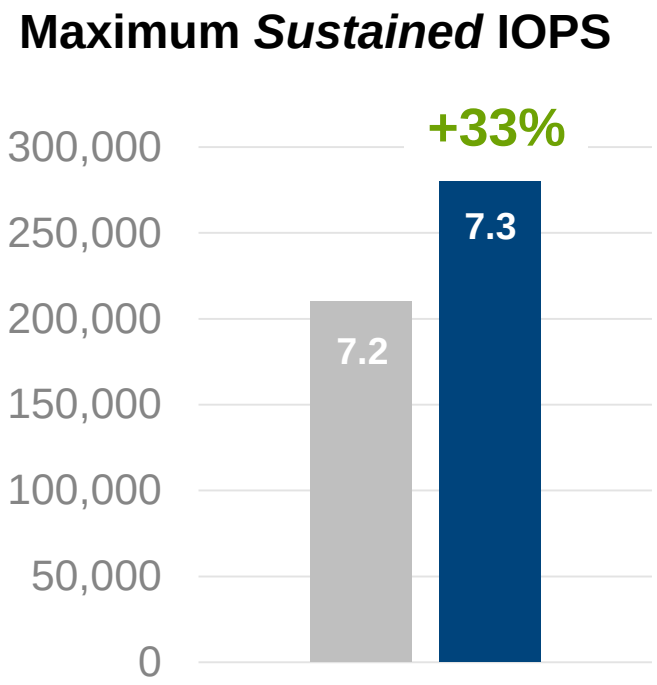
SQL performance improvement with SCOS 7.3

Application test results



Based on internal tests preformed by Dell EMC in February 2018 running TPC-E like workloads (95% reads, 8K sector transfer size) on an SC9000 with 7.3 vs 7.2 firmware. Actual performance will vary based on configuration, usage and manufacturing variability

VDI performance improvement with SCOS 7.3



SCOS 7.3 enabled a 33% increase in supported VMs

…using the same hardware

VDI workload test parameters

- 80% writes
- 1.5 ms latency
- 40 IOPS per VM – very heavy load!

Based on internal tests performed by Dell EMC on an SC9000 with 7.3 vs. 7.2 firmware. Actual performance will vary based on configuration, usage and manufacturing variability.

DELL EMC

SCOS 7.3 scalability increase

Maximum raw capacity (3 arrays improve)

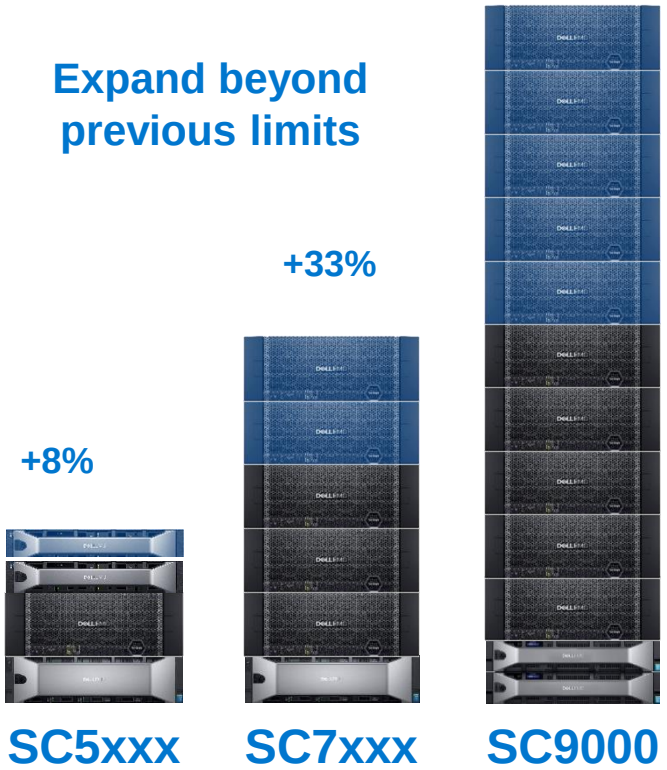
	SC5xxx	SC7xxx	SC9000
SCOS 7.2[1]	2 PB	3 PB	3 PB
SCOS 7.3[1]	2.16 PB	4 PB	6 PB

Maximum # of Live Volumes (all arrays improve)

	SCv3	SC4	SC5	SC7	SC9
7.2 (LV limit*)	100	100	100	100	100
7.3 (non-AFO)	250	500	500	500	500
7.3 (w/AFO)	150	150	150	150	150

Enables larger HA environments

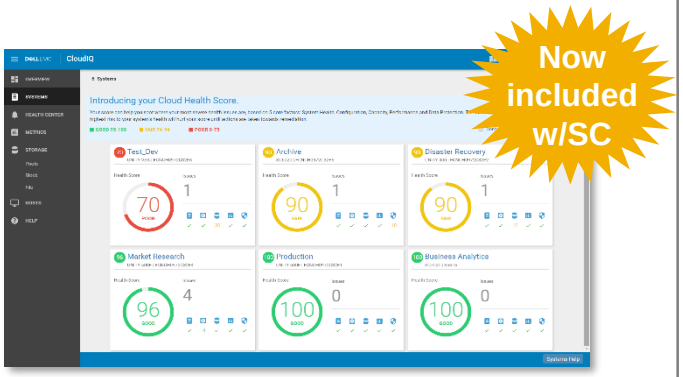
Expand beyond previous limits



1 – Raw capacity. Assumes 2MB page sizes. See Announcement Article for maximums using other page sizes.

Monitor or manage SC arrays from anywhere

CloudIQ

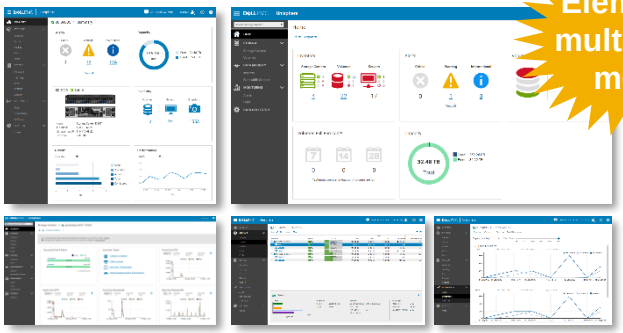


Now included w/SC

- **Cloud based analytics**
- Health score dashboard
- Built-in machine learning predicts anomalies

Unisphere

HTML 5 Web UI

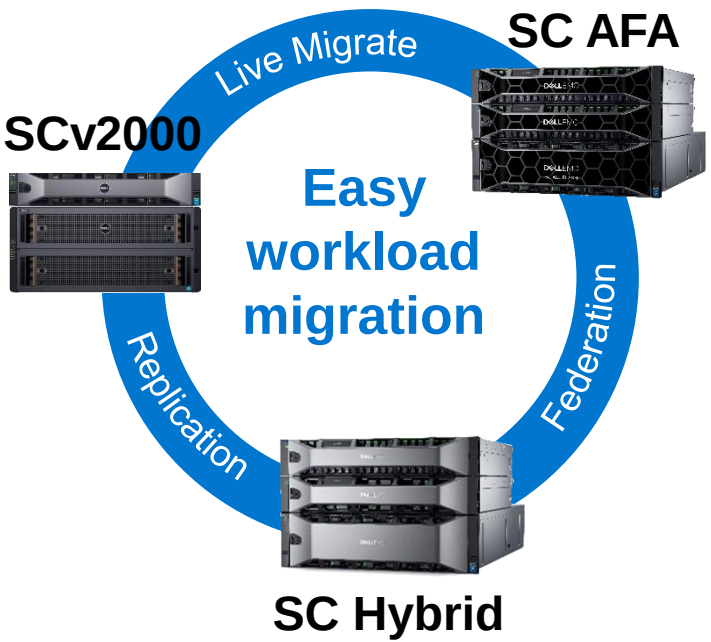


Element + multi-array mgmt

- **Speeds SC deployment – no SW required**
- Manage daily tasks from tablet or phone
- DSM client app still available for advanced management

SCv2000 Federation and Replication

Add newer SC arrays while extending the value of current investment



Now enabled on SCv2000

- ✓ **Live Migrate with *any* SC**
  Full federation capability
  Does NOT require license
- ✓ **Replication with *any* SC**
  Async only, still requires license

SC4020 Data-in-Place upgrade option

Preserve drive, enclosure and software investments

Direct transfer

- **Drives from head**
- **Entire expansion enclosures**

SC4020

SC5020 or SC7020

Easy way to move to new SC technology

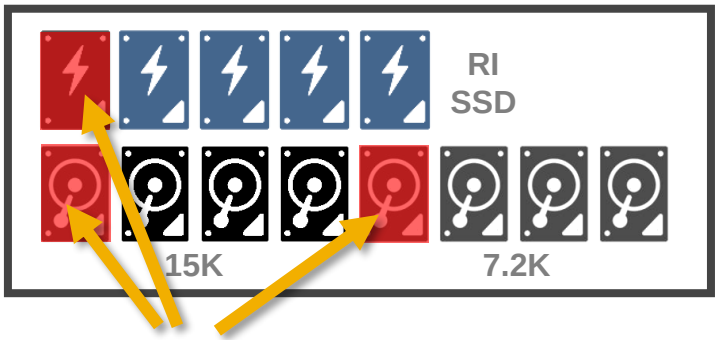
- ✓ **Reduce hardware cost – purchase "empty"**
- ✓ **Quick transfer (no replication), reduce risk**
- ✓ **Works for any media (SSD, HDD, hybrid)**

Services cost and eligibility requirements apply. Best for customers with *large* SSD investments.

Distributed Sparing

Old way

Dedicated spares – One for every 20 drives AND per drive type

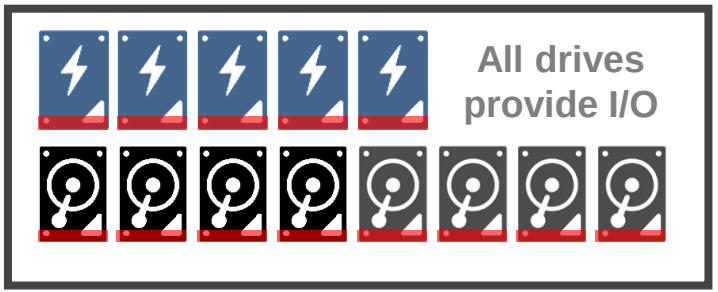


× **Spares remain idle until needed, do not contribute to I/O**

× **Rebuilds take longer, writes to single spare = bottleneck**

Distributed sparing

Spare capacity spread across all drives
No dedicated spares required



✓ **Improved efficiency**

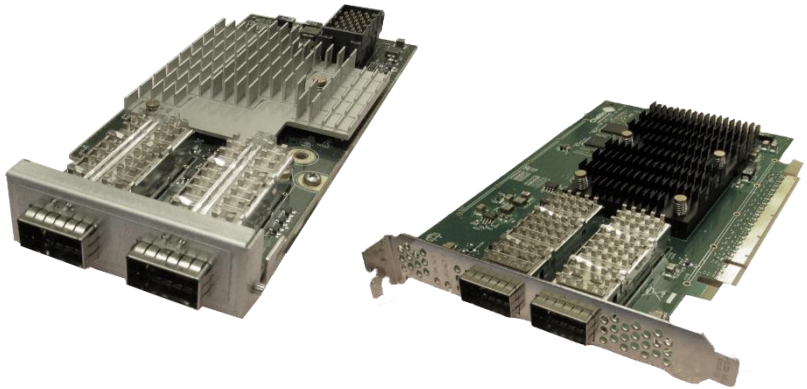
✓ **Reduced risk of data loss**

✓ **Up to 500% faster rebuilds**

100Gb and 25Gb iSCSI I/O support

25Gb	100Gb
2-port PCI-e 2-port mezzanine	2-port PCI-e 2-port mezzanine
SFP28 Copper or Optical	QSFP28 Copper or Optical
Array support: SC All-Flash: SC7020F, SC5020F SC Hybrid*: SC9000, SC7020, SC5020	
Available Now	

Make *your* storage ready for tomorrow's networks



***** 100GbE supports 100GbE only, while 25GbE also supports 10GbE

* SCv3000 Series and previous-generation models not supported

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SCOS 7.3 Checklist: Reasons to upgrade

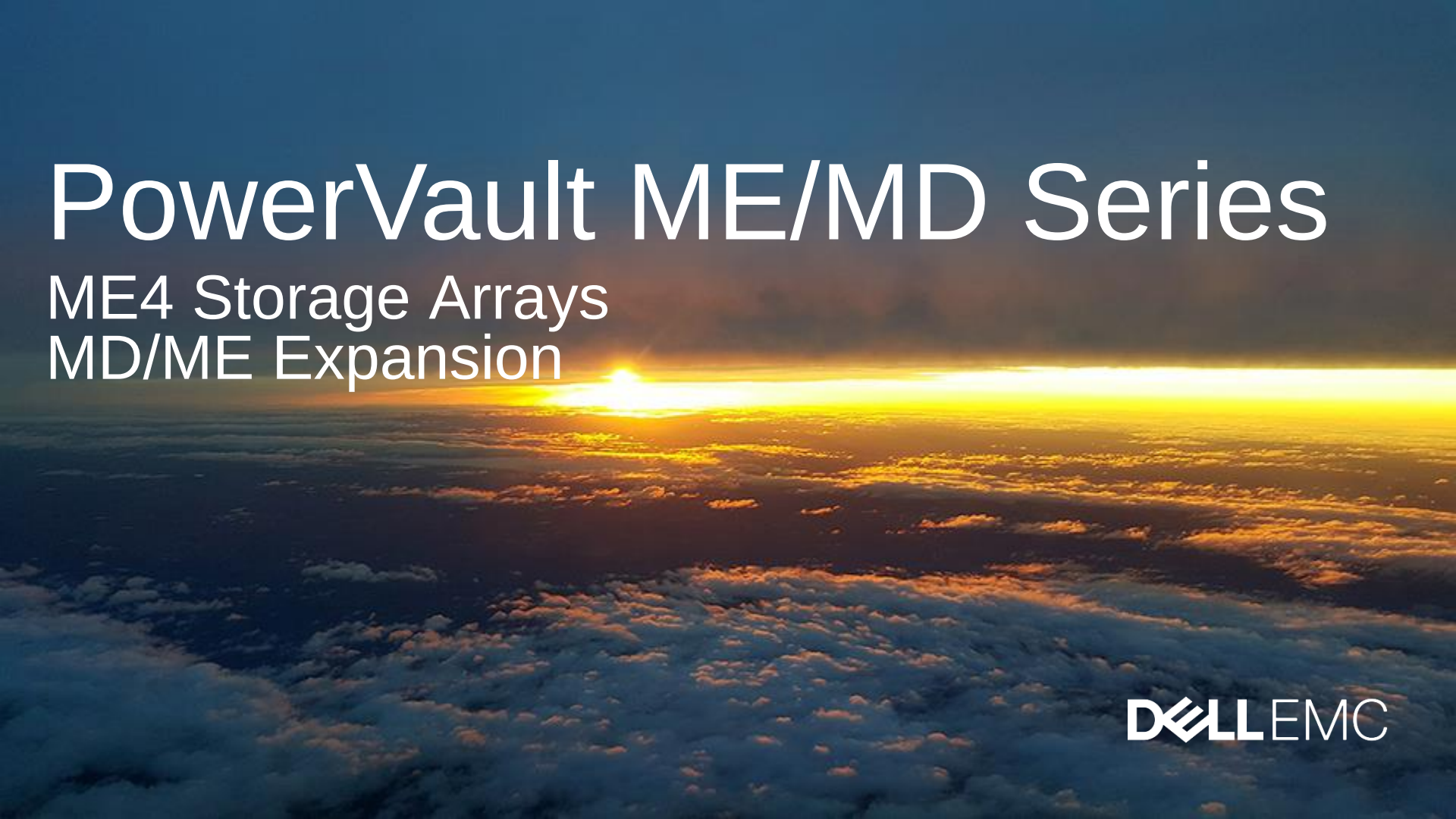
✓ Performance boost	2X max IOPS *for every current SC model*
✓ Unisphere for SC Web UI	Now manage SC from anywhere, accelerate deployment
✓ CloudIQ	FREE cloud-based analytics tools
✓ Max capacity increase	Up to 2X (SC9000 now 6PB raw!)
✓ 100/25Gb iSCSI	Ready for tomorrow's networks!
✓ DIP upgrades for SC4020	Move drives and enclosures directly to SC5020/SC7020
✓ SCv2000 Federation/Replication	Easy to add latest SC, migrate workloads
✓ Distributed sparing	Up to 500% faster rebuild times, I/O from all drives
✓ LV enhancements	Reduced latency, network traffic, up to 500 LVs

Time to kick your SC advantage…into overdrive

DELL EMC

PowerVault ME/MD Series

ME4 Storage Arrays
MD/ME Expansion



DELL EMC POWERVAULT ME4 SERIES SUCCESS SINCE FY Q319

CAPACITY

RAW	350 PB+
FLASH	9 PB+

REVENUE

TOTAL	**$63 M**
%FLASH	13%

SYSTEMS

TOTAL	3,000+
AFA*	260+

CUSTOMERS

TOTAL	1,700+

* AFA Array Count also included as part of Total

Introducing the Dell EMC PowerVault ME4 Series

Enhanced performance, efficiency, & enterprise capabilities

NEW!

ALL FLASH or HYBRID TO 4PB RAW CAPACITY

ENTRY LEVEL AFFORDABLE

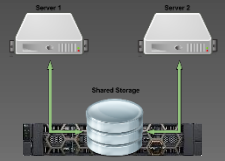
Low cost starting configurations
All-inclusive software
Buy the exact expansion capacity you need

DIRECT ATTACH READY

SIMPLE & EASY TO USE

New web-based (HTML5) management GUI
Installs and configures in 15 minutes
Flexibility deploy from 0 to 100% flash

SHARED SAN STORAGE



FAST & POWERFUL

4 core Broadwell Processors
Up to 320K[1] IOPS performance
Performance @ scale via 12Gb SAS backend

All from the #1 in the Entry Storage Market[2]

1 AD# G18000167 Based on Seagate Technology's LX-3 Performance Characterization report, 2018 (Virtual Test Results)
2 WW Enterprise Storage Systems (HW) Market Overview: Q1CY18 IDC Results June 2018

PowerVault ME4 Series family

It doesn't need to be big to be powerful

ME4 Expansion Enclosures

Product Name:	ME4012	ME4024	ME4084	ME412	ME424	ME484
						
Configuration:	2U12 drives	2U24 drives	5U84 drives	2U12 drives	2u24 drives	5U84 drives
Max Raw Capacity	**3.1PB**	**3.0PB**	**4PB**			
Min/Max Drives	**2/264**	**2/276**	**28/336**			
Media	Hybrid (0-100% Flash)					
Protocols	16Gb FC, 10Gb iSCSI, 12Gb SAS			12Gb SAS Backend		
Data Protection	Virtual Copy, Snapshots, Async Replication, SEDs					
Performance	Tiering, Read Cache					
Integration	VMware Vcenter Plugin, SRM Plugin					
Management	ME Storage Manager					
Architecture	Thin provisioning, ADAPT, Internal Key Manager (encryption)					

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PowerVault ME4 Series applications/use cases

Exceptional workload performance, virtual and linear modes

PowerVault ME4012

PowerVault ME4024

PowerVault ME4084

Surveillance

HPC

vmware

Virtualization/VDI

SAN/DAS Exchange

ROBO

ROBO

OEM Solutions

NoSQL

NoSQL Databases

Video Editing

DELL EMC

PowerVault ME4 software is all-inclusive

BUILT-IN SOFTWARE FEATURES

ADAPT (Distributed RAID)
Improved DDP-like functionality enabling affordable capacity expansion and faster drive rebuild times.

Thin Provisioning
Allocate and consume physical storage capacity as needed in disk pools

SSD Read Cache
Increase execution speed of applications by caching previously read data

IP Remote Replication
Replicate data to any global location that includes mirroring thin provisioned pools

FC Remote Replication
Replicate data to any global location that includes mirroring thin provisioned pools

Snapshots
Easily recover files after accidental deletion or alteration with point-in-time copies of data

3 Level Tiering
Improve performance and efficiency with less hardware expense

NEW!

Volume Copy
Seamlessly clone volumes for re-purposing on different spindles and drives

Encryption (SED)
Render data useless to unauthorized users with drive-level encryption, even if the drive has been removed from the enclosure

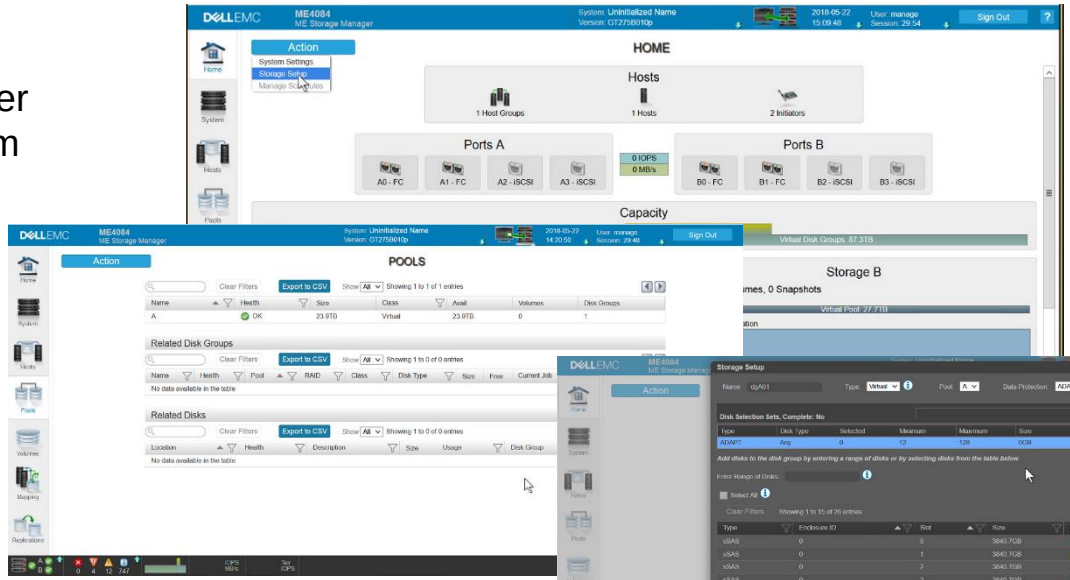
vCenter/SRM
VMware vCenter Server & SRM integration to move live VMs at scale between sites

Simplified web-based management

Manage ME4 Series storage from anywhere

- HTML5
- Single-array intuitive element manager
- Use common management tasks from convenient locations
- Manage storage profiles, network connections, alerts, more
- Configure in 15 minutes

ME Storage Manager Login Screen



ME4 Series supports CLI management

Why CI&HCI? — NOBODY HAS TIME FOR DIY…!

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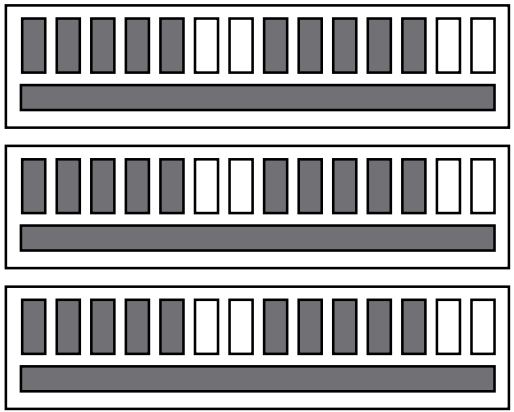
HC & HCI Infrastruktura

Converged & Hyper Converged infrastructure

Minimizes risk and enables pay as you grow

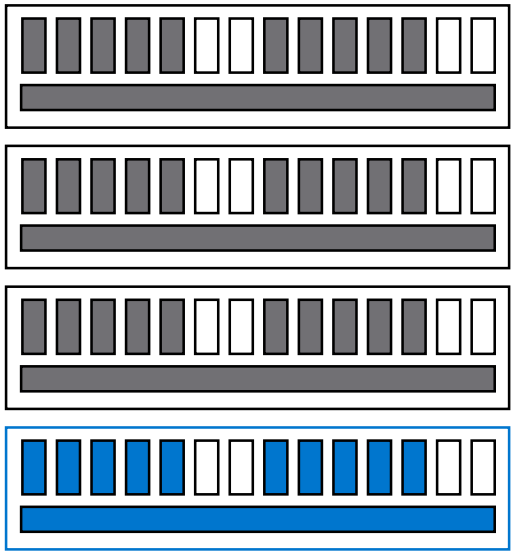
START WITH WHAT YOU NEED

Minimize risk by closely matching your requirements



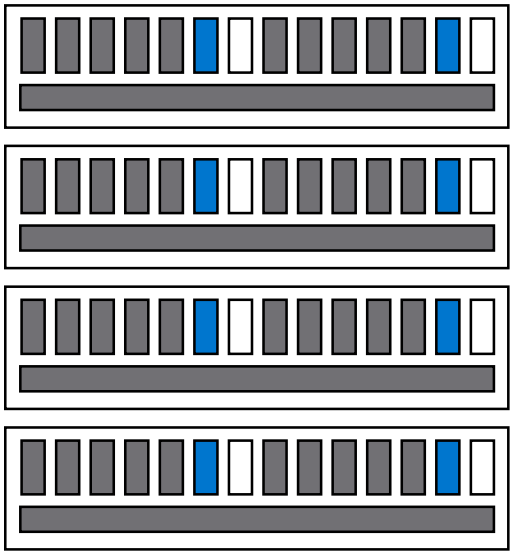
SCALE OUT

Add as few a one node to increase performance and capacity



SCALE UP

Incrementally add storage as data grows



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Modern converged systems

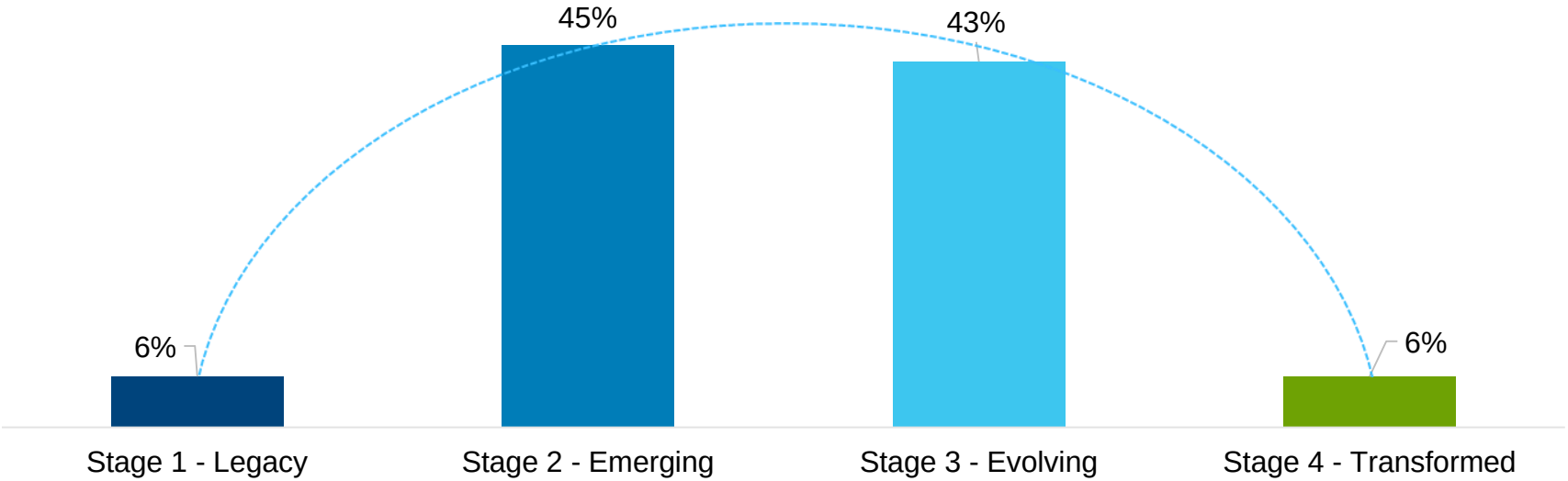
Appliances

Racks

Blocks

DELL EMC

Sponsored by Dell EMC and Intel April 2018
IT Transformation Maturity Study of 4,000 IT Decision Makers



Adoption of Modern Data Center Tech

Adoption of Modern IT Processes

Focus on Business and IT Alignment

DELL EMC

Sponsored by Dell EMC and Intel April 2018
IT Transformation Maturity Study of 4,000 IT Decision Makers

81%

agree that if they do not embrace **IT TRANSFORMATION**, their firm will no longer be **COMPETITIVE** in their market (10% increase vs. 2017)

Transformed organizations…

8x

more likely to be **cost competitive** vs. public cloud

10x

more likely to **deploy apps** ahead of schedule

2x

more likely to **beat revenue** targets

"98% of Transformed companies use either converged or hyper-converged infrastructure and 86% report utilizing both."[1]

1 – ESG Research Insights Brief: The Role of Converged and Hyperconverged Infrastructure in IT Transformation

DELL EMC

The promise of IT Transformation

- Less costly tech refreshes and risky data migrations
- Easier, less costly to monitor, sustain, and support
- Shorter installation and deployment timelines
- Accelerate path to hybrid cloud
- Operational efficiencies managing storage and app silos
- Avoid bottlenecks, hot spots, and lack of scalability

CI and HCI can make this a reality

Critical elements of a modern data center

All-Flash | Scale-Out | SW-Defined | Cloud-Enabled | Intelligent | Trusted

Traditional and Cloud-Native Applications

Best of Breed Components

Servers

Storage

Networking

Data Protection

Converged

Hyper-Converged

#1

FASTER | SIMPLER | LESS RISK

DELL EMC

Deliver consistent benefits and customer value – for every size, and for every workload

- Turnkey experience
- Full lifecycle assurance
- Fully tested and pre-configured
- Simplified management
- Single end-to-end support

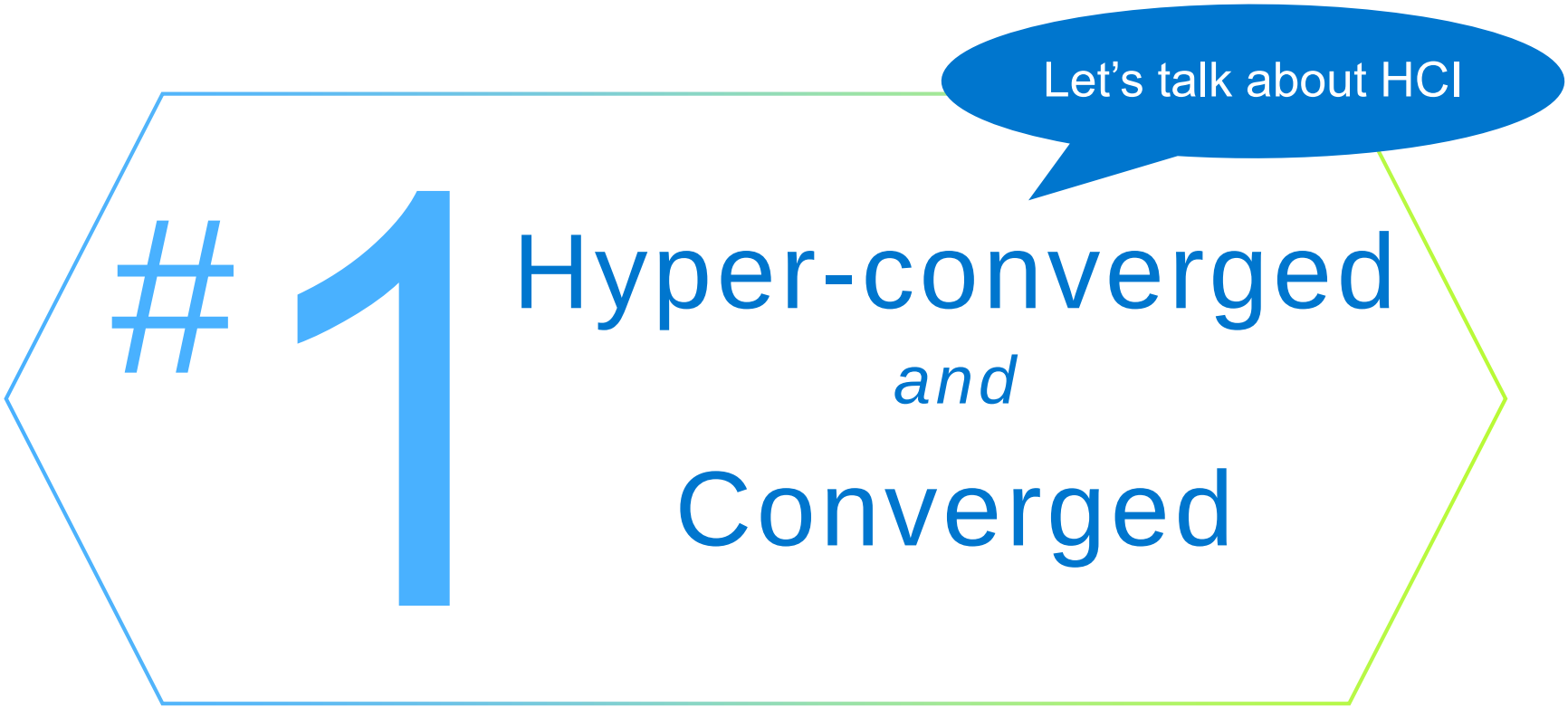
APPLIANCES

RACKS

BLOCKS

Powered by Intel® Xeon® Scalable Processors

Dell EMC Industry Leadership



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Making it real - Dell EMC's HCI Portfolio

Powered by Intel® Xeon® Scalable Processors

Software-defined | High automation | Supports most workloads

	VMware	Mixed Hypervisor	Microsoft
Rack-scale	*Easiest and fastest way to stand up a VMware SDDC* VxRack SDDC 	*When performance and scalability are top priority* VxRack FLEX 	*Purpose built HCI for Microsoft Azure Stack* Cloud for Microsoft Azure Stack VxRack AS 
Appliance	*Turnkey appliance with full lifecycle simplification* VxRail 	*When hypervisor choice is a requirement* XC Series 	*When Microsoft Hyper-V is a requirement* XC Series 
Ready Node	*For existing lifecycle management processes with VMware vSAN* vSAN Ready Node 	*For hypervisor flexibility with VxFlex OS* VxFlex Ready Node 	*For Microsoft Hyper-V on Storage Spaces Direct* Microsoft Storage Spaces Direct Ready Node 

DELL EMC

Accelerate IT Transformation with Dell EMC VxRail

Powered by Intel® Xeon® Scalable Processors

73% Faster to deploy[1]

46% Lower cost of operations[2]

619% 5-year ROI[1]

ACCELERATES TRANSFORMATION

SEAMLESS INTEGRATION

ONE SINGLE END-TO-END LIFECYCLE SUPPORT

FULLY LOADED SERVICES

HIGHLY CONFIGURABLE

[1] IDC Oct. 2017
[2] Silverton Consulting, July 2017

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VxRail hyper-converged, self-contained infrastructure

What is in a node?

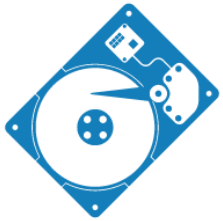
Processor

RAM

Redundant power & cooling

Network Connectivity (1Gbps/10Gbps)

GPU (V Series)



All-flash or hybrid disk packs

DELL EMC

VxRail models

Purpose built nodes for multiple use cases

G Series Nodes

General purpose

All-flash or hybrid

Up to 19.2 TB/node

E Series Nodes

Entry level

All-flash or hybrid

Up to 30.7 TB/node

V Series Nodes

VDI optimized

All-flash or hybrid

Up to 46 TB/node

P Series Nodes

Performance optimized

All-flash or hybrid

Up to 46 TB/node

S Series Nodes

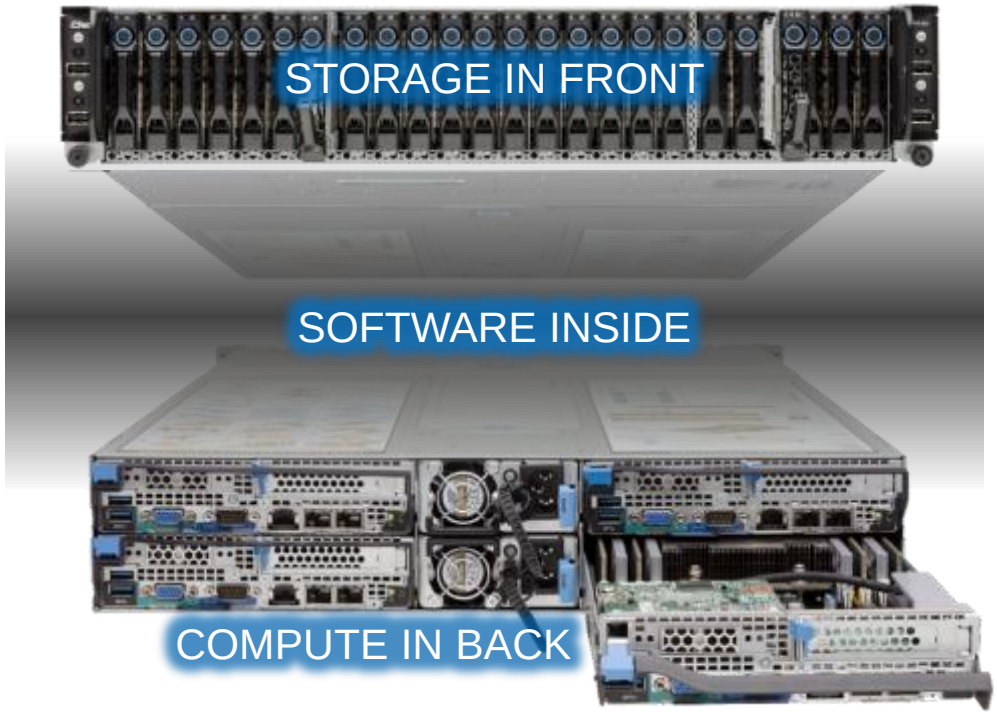
Storage dense

Hybrid only

Up to 48 TB/node

		G Series	E Series	V Series	P Series	S Series
						
Per node	Form Factor	2U4N	1U1N	2U1N	2U1N	2U1N
	CPU	1.7 – 3.5 GHz 5th generation Intel Xeon E5-2600 Family, 8 – 44 cores*				
	Storage Type	Flash or hybrid	Flash or hybrid	Flash or hybrid	Flash or hybrid	Hybrid
	Max Capacity	19.2 TB	30.7 TB	46 TB	46 TB	48 TB
	Max Memory	512 GB	1536 GB	1024 GB	1536 GB	1536 GB
	Appliance Connectivity	2x10 GbE or 4x1 GbE	2x10 GbE or 4x1 GbE	2x10 GbE	2x10 GbE	2x10 GbE or 4x1 GbE

Anatomy of an G appliance node



- G-series appliances have 1-4 nodes and a chassis, all other series are a single node per appliance (or chassis)
  - A fully populated G-series appliance has 4 nodes
  - A partially populated G-series appliance has 1-3 nodes
- A node has a compute blade and a disk pack
- A compute blade has CPUs, DIMMs, and NICs
- A disk pack has a cache SSD and storage HDDs/SSDs
  - Hybrid node has 3-5 HDDs (storage)
  - All-flash node has 1-5 SSDs (storage)

VxRail is powered by VMware vSAN 6.7

- The best technology for the leading virtualization ecosystem

50%
FASTER ALL FLASH

35%
LATENCY REDUCTION

DATA AT REST ENCRYPTION
NATIVE HCI ENCRYPTION

ENHANCED STRETCHED CLUSTERS
LOCAL AND SITE PROTECTION

#CLOUD_ENABLED

A full suite of capabilities included at no additional charge

POWERED BY VMWARE vSAN

vSAN Enterprise

vCenter Server

vRealize Log Insight

vSphere Ready*

LIFECYCLE MANAGEMENT AND SUPPORT TOOLS

VxRail Manager

Secure Remote Support

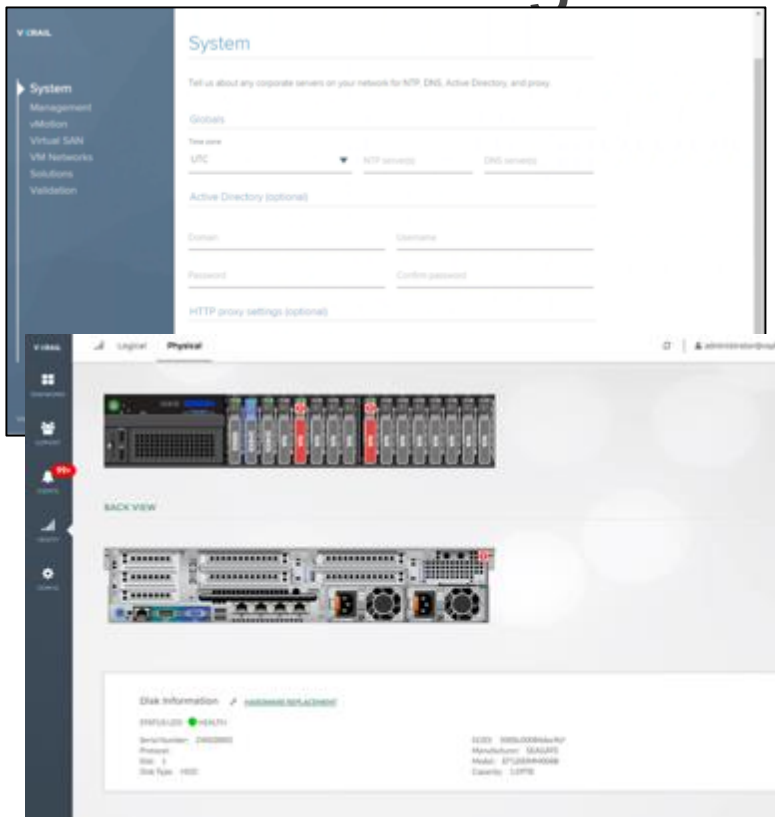
INCLUDED DATA PROTECTION OPTIONS

RecoverPoint for VMs

vSphere Replication

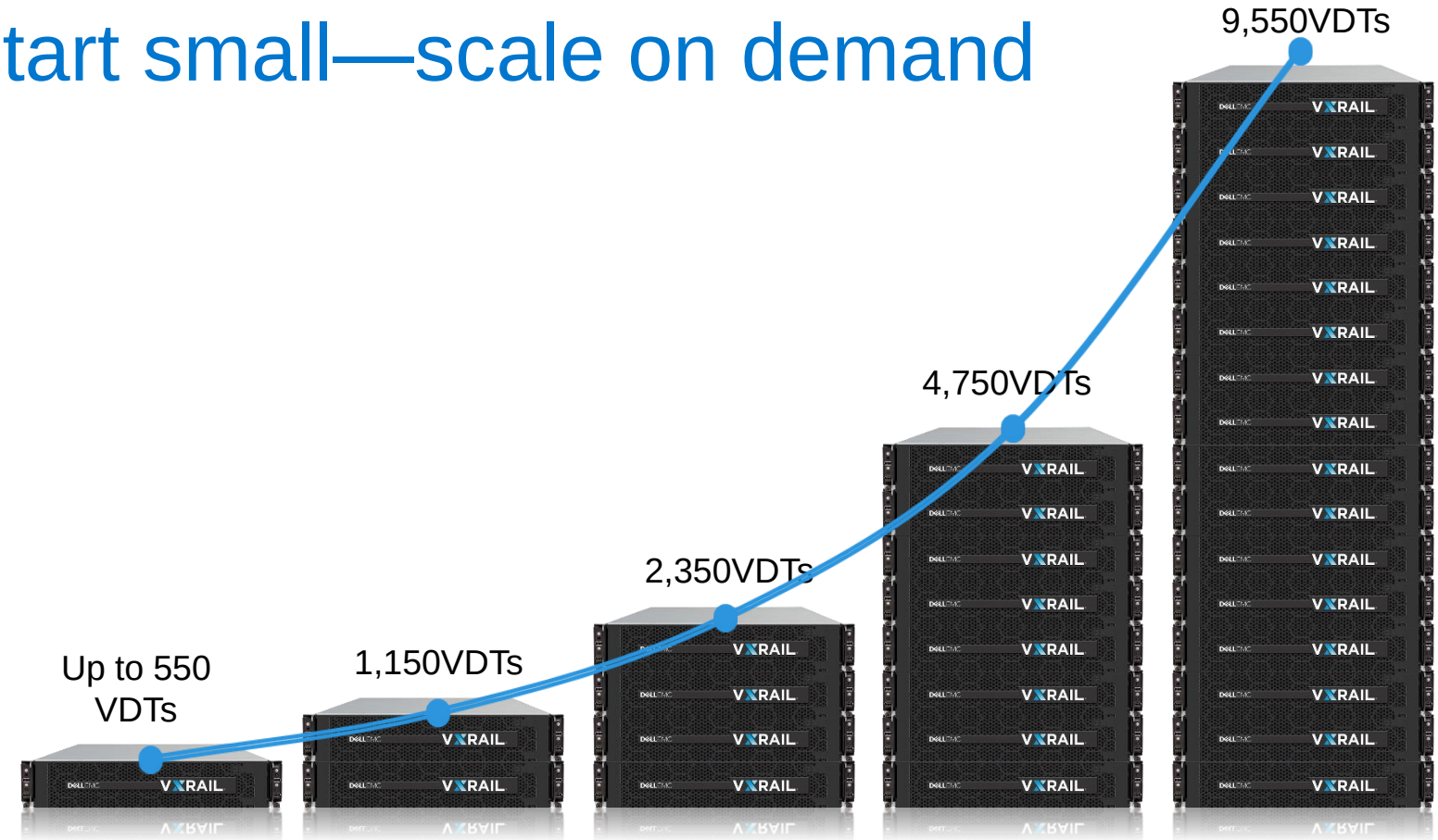
vSphere Data Protection

VxRail Manager – 200+ steps automatized



- Environment initialization
- Firmware/software update
- Health monitoring
- Support cases
- Log collection
- Add node to cluster
- HW replacement support

Start small—scale on demand



Task-based Worker: linked-clone 24GB OS master, 5GB user data, 1 vCPU, 2GB RAM, 6vCPU/core

DELL EMC

VxRack SDDC with VMware Cloud Foundation

Co-engineered by VMware and Dell EMC

The **easiest and fastest** way to deploy, support and extend a production-ready VMware cloud

Simplify
life-cycle management and operations of the platform

Accelerate
IT service delivery through self-service catalog and automation

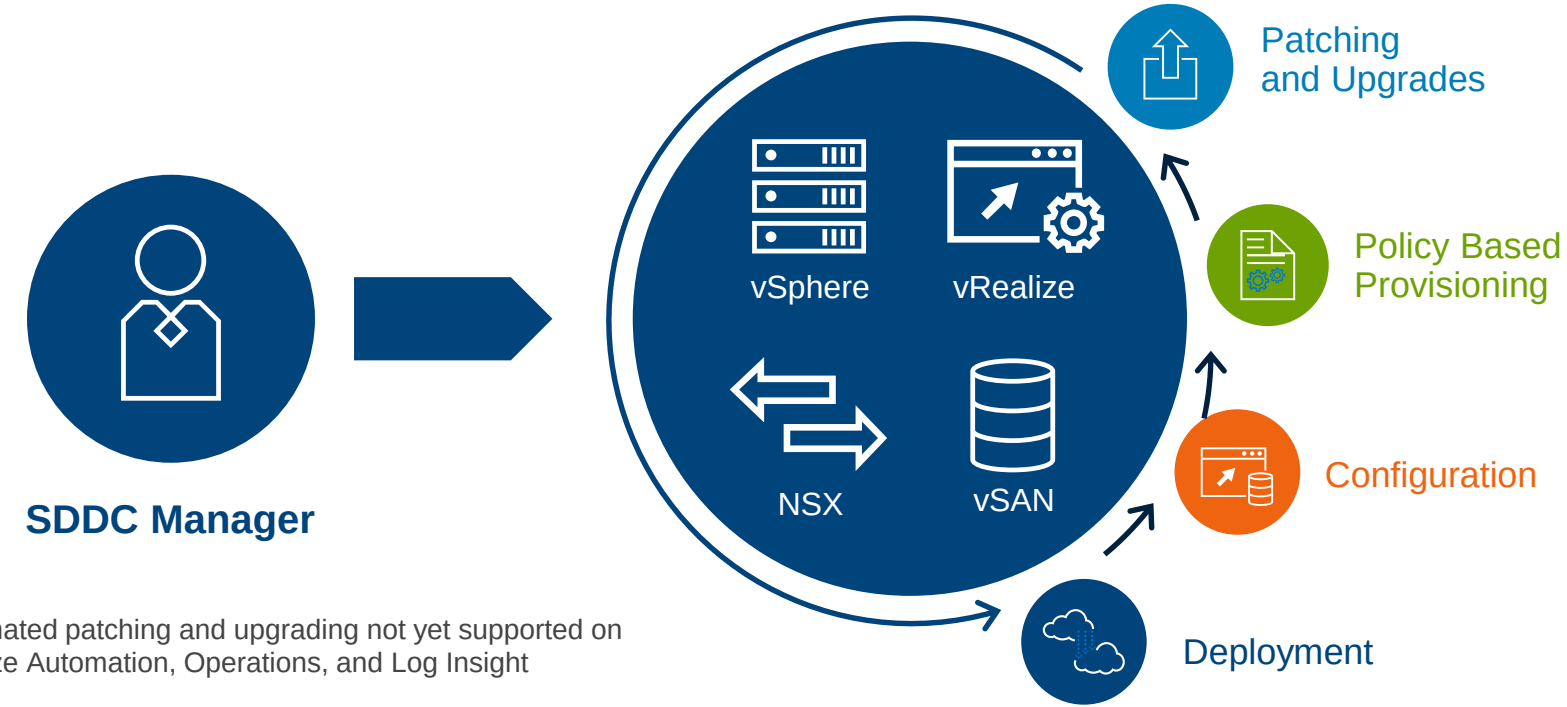
Monitor
the platform to get better operational visibility and cost transparency

Extend
the platform with optional IaaS extensions and public cloud endpoints

Acceleration. Simplification. Extensibility.

DELL EMC

Brought together by the SDDC Manager control plane



*Automated patching and upgrading not yet supported on vRealize Automation, Operations, and Log Insight

Dell EMC VxRack SDDC value prop

Engineered — Complete system designed as one for easy deployment and scalability

Manufactured — Fully integrated software and hyper-converged Dell EMC PowerEdge rack-scale solution

Managed — Simplified management built in with the VMware SDDC Manager for complete ease of use

Supported — Single support model with expertise on the total solution

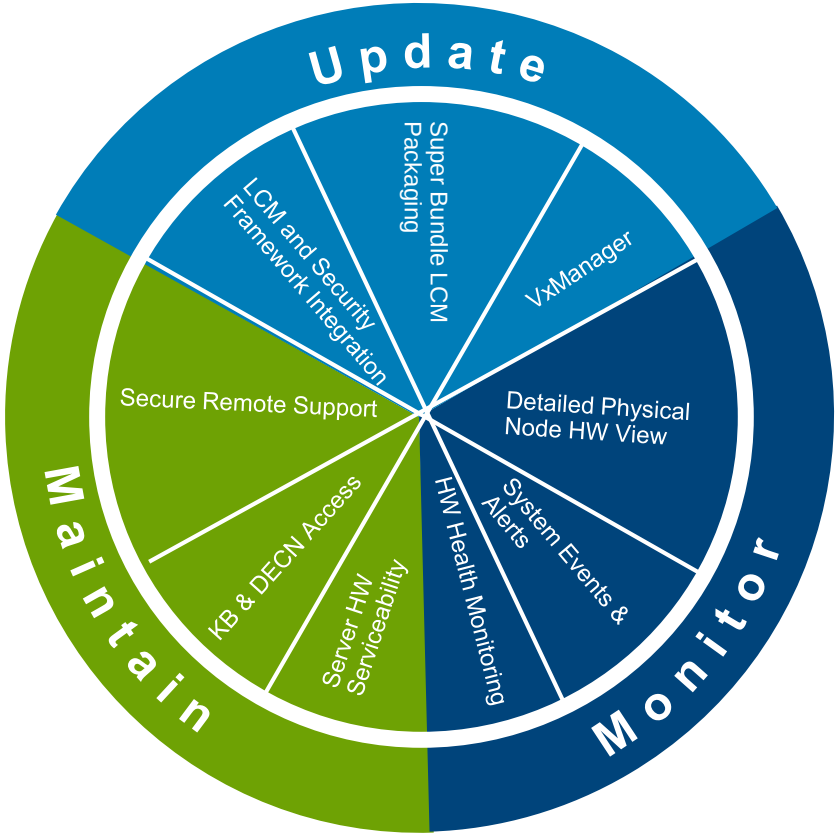
Sustained — Complete system lifecycle assurance with documented standards for future growth

TO LEARN MORE, ATTEND *"VxRack SDDC: Technical Deep Dive Including Review Of The Features Provided By VMware Cloud Foundation (VCF)"*

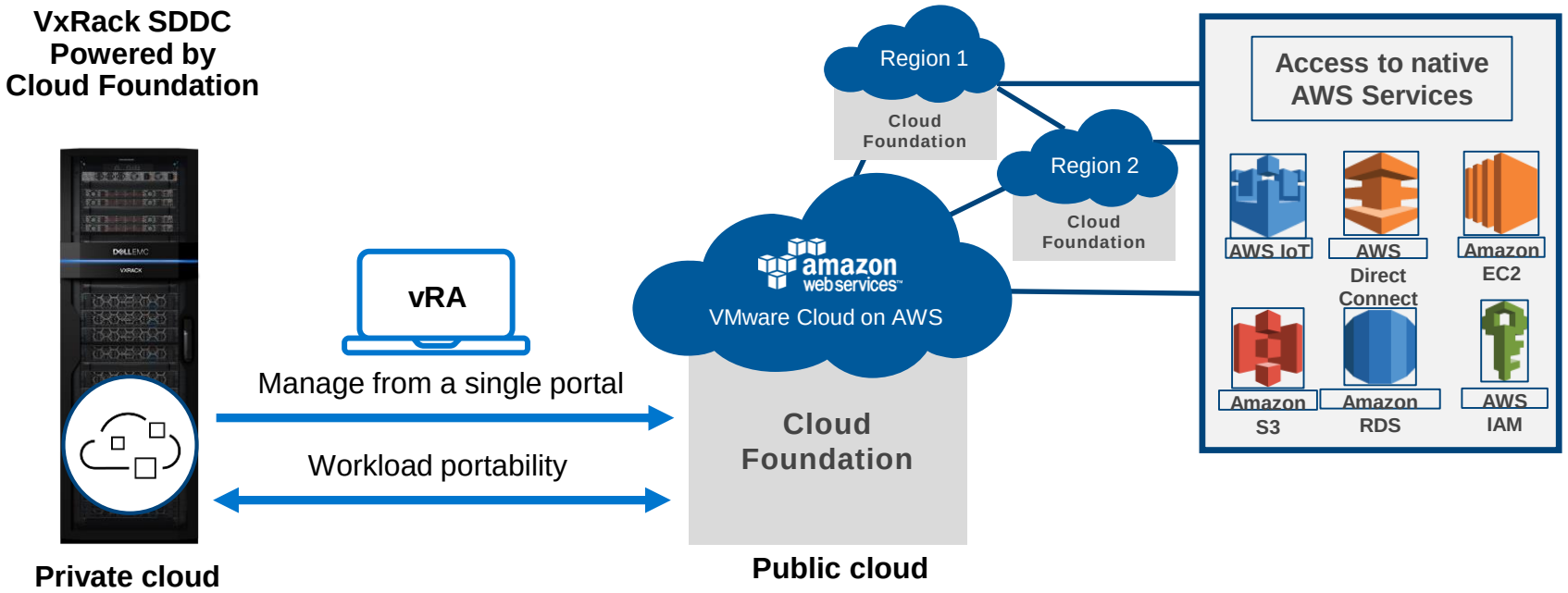
VxRack SDDC Automation and Serviceability Extensions

Automation, support, and serviceability capabilities integrated with SDDC Manager to extend the Cloud Foundation management experience and simplify operations

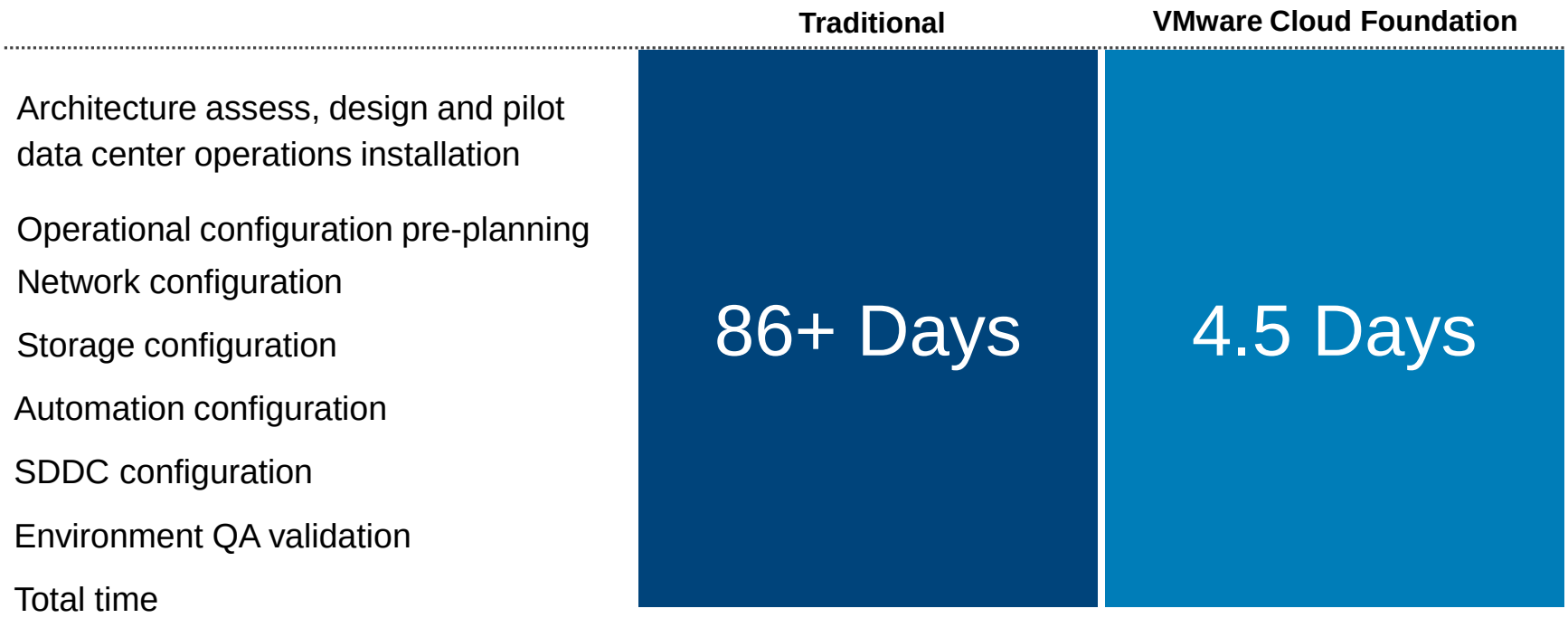
- **Update** as an integrated part of the SDDC Manager LCM and security framework
- **Monitor** events/alerts, and detailed physical node HW views
- **Maintain** with direct access to support, articles, and community as well as server HW component replacement serviceability



Extend to public cloud to build a hybrid cloud

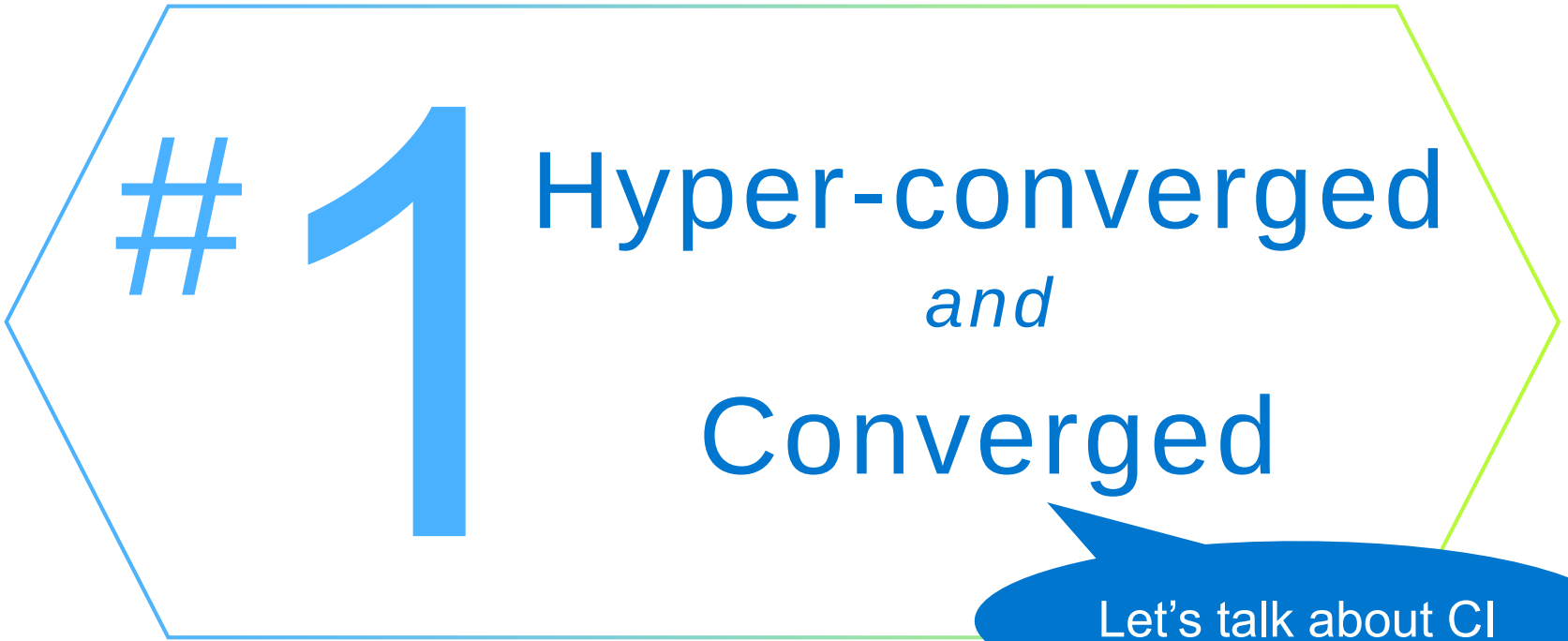


VMware Cloud Foundation - Customer case study



1 day = 8 man-hours
Numbers provided by One Cloud early field trial deployment

Dell EMC Industry Leadership



DELL EMC

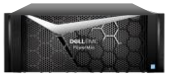
Making it real - Dell EMC VxBlock 1000

Industry's Only All-in-One CI System

Unprecedented Technology Choice | Simplified Life Cycle Management | Evergreen Architecture

Broadest range of market-leading storage arrays powered by Intel® Xeon® Scalable Processors

Data services optimized for all classes of workloads and price/performance objectives



Dell EMC PowerMax

Dell EMC XtremIO X2

Dell EMC Unity

Dell EMC VMAX

Dell EMC Isilon-Gen 6

1000-plus compute server configurations

CPU and memory options to meet every application price/performance objective

Cisco UCS Rack Servers

Cisco UCS Blade Servers

Market-leading LAN and SAN switches

High resource scalability with predictable performance

Cisco Nexus LAN Switches

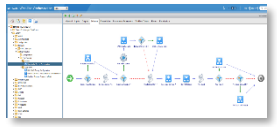
Cisco MDS SAN Switches

Broadest suite of integrated data protection solutions

Protection for critical system and production applications and data

Converged management, reporting and orchestration

Simplifies daily operations for IT transformation



DELL EMC

VxBlock 1000 – a new CI generation

Business agility

Right mix of resources and data services for evolving application needs

Data center efficiency

Shared resource pool to maximize utilization, eliminate stranded capacity, and increase ROI

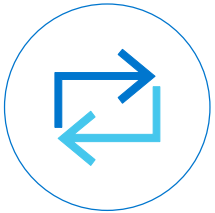
Operational simplicity

An engineered system experience with lifecycle assurance enables innovation

Powered by Intel® Xeon® Scalable Processors

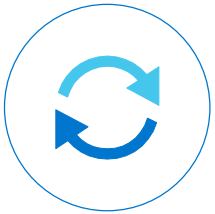
DELL EMC

Key Takeaways

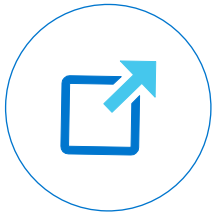


Agility

Simplicity



Modernize



Scalability

1 Converged (CI) and Hyper-converged infrastructure (HCI) are the fastest and simplest way to modernize the data center

2 CI and HCI deliver the business agility, scalability, and simplicity needed to stay competitive

3 Convergence will continue to be a catalyst for transformation – don't get left behind!

Thank You!

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DELL EMC